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ABSTRACT

The main body of this document consists of papers that were presented at the seminar. The document also includes an outline of the seminar proceedings, a list of participants and staff members, a list of the organizing committee, and several reports of the findings and recommendations of the seminar working groups. Papers presented by guest speakers and staff cover such topics as the problem of education in Southeast Asia, teacher education, areas of priority in curriculum development, programed instruction, a systems approach to curriculum development, educational goals, teaching science to children, the mathematics curriculum of the future, and curriculum development in the United Kindgom. Papers presented by the delegates to the convention deal with strategies for curriculum development in their respective home countries. These delegates represented Hong Kong, Indonesia, the Khmer Republic, Laos, Malaysia, the Philippines, Singapore, Thailand, and Vietnam. (Photographs may reproduce poorly.) (DN)

P5/SCMS/28

SOUTHEAST ASIAN MINISTERS OF EDUCATION ORGANISATION

ED 078574

SEMINAR

STRATEGIES FOR CURRICULUM DEVELOPMENT IN SOUTHEAST ASIA

Convened by

SEAMEO REGIONAL CENTRE

FOR EDUCATION IN SCIENCE AND MATHEMATICS

with the co-operation

of the Government of Malaysia.

FINAL REPORT

EA 005 249

SEAMEO - RECSAM,
GLUGOR, PENANG,
MALAYSIA.

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION
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14th-20th March, 1972.

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PROCEEDINGS

I. OPENING CEREMONY

The Seminar for Senior National Administrators, organized by the SEAMEO-Regional Centre for Education in Science and Mathematics was held at the Convention Hall of Hotel Merlin from 14th to 20th March, 1972. The theme for this Seminar is " Strategies for Curriculum Development in Southeast Asia. "

More than thirty participants took part in this Seminar. Participants comprised delegates from all SEAMEO member countries, guest speakers from educational institutions in SEAMEO countries and from CEDO, United Kingdom, and a representative from the Department of Education, Hong Kong, as well as the professional staff of RECSAM.

The Seminar was declared open by the Chairman of the Governing Board of RECSAM, Mr. Ishak bin Haji Pateh Akhir J.M.N., who is also the Deputy Secretary-General of the Ministry of Education, Malaysia. The Welcoming Address by the Director of RECSAM, Mr. Chin Pin Seng, and the Opening Address by the Chairman of the Governing Board of RECSAM appear as Appendices I and II respectively.

II. PLENARY SESSIONS I-V

1. Election of Chairman, Vice-Chairman and Rapporteur-General

Chairman : Mr. Tan Teik Beng, Delegate from Malaysia

Proposer : Mr. Lim Chin Chee, Delegate from Singapore

Seconder : Mr. Domingo Soriano, Delegate from the Philippines

Vice-Chairman : Dr. Domingo Soriano, Delegate from the Philippines

Proposer : Mr. Tan Teik Beng, Delegate from Malaysia

Seconder : Dr. Setijadi, Delegate from Indonesia

Rapporteur-General : Mr. Lim Chin Chee, Delegate from Singapore

Proposer : Dr. Setijadi, Delegate from Indonesia

Seconder : Mr. Phouangphanh Sananikone, Delegate from Laos

2. Adoption of Seminar Programme

2.1 Dr. Domingo Soriano of the Philippines proposed that the programme for the Seminar be adopted. His proposal was seconded by Mr. P. Sananikone of Laos and the Seminar programme was adopted without amendment.

3. Presentation of Papers by Guest Speakers/RECSAM Staff

3.1 Paper entitled " Action and Reaction "

3.1.1 The paper entitled ' Action and Reaction ' was presented by Mr. A. S. Everest. Mr. Everest suggested that the problems of education in S.E. Asia were very pressing and accordingly urged speed and simplicity in implementing educational reforms which should be based on a realistic assessment of the available resources and relevant administrative problems.

3.1.2 Views expressed during the discussion indicated that one of the main difficulties which confronted SEAMEO countries in the implementation of educational reforms was the scarcity of resources. Another difficulty was the great importance attached to pupils' performance in examinations, especially the public examinations.

3.2 Paper entitled " A Second Look at Teacher Education and School Curriculum Reforms "

3.2.1 The paper entitled ' A Second Look at Teacher Education and School Curriculum Reforms ' was presented by Mr. Chin Pin Seng. It was noted that whilst UNESCO and other international agencies, including the SEAMEO Regional Centre for Educaton in Science and Mathematics (RECSAM), had been playing a significant role in assisting these SEAMEO countries to attain a breakthrough in the reform of mathematics and science education, teacher-education development had not caught up with the pace of school curriculum development. Mr. Chin suggested that teacher education institutions should concentrate on the specific job of training teachers to teach effectively, make learning relevant to the children, and prepare them to face the challenges of the future and at the same time involve themselves as much as possible with the curriculum reform projects carried out at various school levels by agencies in their own countries.

3.2.2 During the discussion, it was suggested that teachers should be encouraged to innovate for the improvement of education. Sabbatical leave should be granted to innovative and talented teachers in order to enable such teachers to update themselves with the latest teaching methods. On their return, such teachers should, as far as possible, be required to train other teachers so that the knowledge they gained during their sabbatical leave might be put to the maximum use.

3.3 Paper entitled " Does the Systems Approach Really Work in Curriculum Development? "

3.3.1 Mr. Lam Kok Hon presented the paper entitled ' Does the Systems Approach Really Work in Curriculum Development? ' The main properties of the Systems Approach are a loop of systematic steps and questions whereby a decision-maker can use a guide to develop his thoughts and ideas logically so that he can visualise the situation and come to a decision that is not only comprehensive and effective, but that it will also be the basis for which he could re-evaluate and re-construct it to fit the change in time, place and circumstance. As to whether the Systems Approach would work in curriculum development, this would depend on many aspects, some of which being how, which, why, by whom and where it would be used.

3.4 Paper entitled " A New Look at Educational Objectives in South East Asia "

3.4.1 The paper entitled ' A New Look at Educational Objectives in South East Asia ' was presented by Dr. Eleanor T. Elequin. Dr. Elequin indicated that according to the findings of a Philippines Case Study, educational goals, aims and objectives were based on and derived from explicit and implicit national goals.

3.5 Paper entitled " Mathematics Curricula in 1990 "

3.5.1 Professor Lee Peng Yee who presented his paper entitled ' Mathematics Curricula in 1990 ', was of the view that mathematics should be regarded as an exeprimental science. He favoured the introduction of more logical reasoning in the mathematics curriculum. The introduction of new syllabus for modern mathematics should be considered in close relation with all relevant factors such as the training of teachers, the nature and scope of examination, as well as the availability of suitable textbooks.

3.6 Paper entitled " Areas of Priority in Curriculum Development "

3.6.1 The paper entitled ' Areas of Priority in Curriculum Development ' was presented by Dr. Fatimah bt. Hamid Don. Dr. Fatimah stressed that education should aim at the development of the individual as well as the society. She suggested the following criteria for the choice of curricular content :—

(i) Concepts, key ideas, themes and generalizations which are essential to understanding the structure of each field of knowledge.

(ii) Activities which are needed to develop insight into modes of inquiry used by scholars or experts in the field.

(iii) Materials which are needed to develop independent study skills, laboratory and research techniques and critical and creative thinking abilities.

(iv) Materials which are needed to reveal limitations of existing knowledge, unsolved issues and problems in need of study.

(v) Activities which are directly or indirectly related to national and societal needs.

3.7 Paper entitled "Strategies for Curriculum Development in U.K."

3.7.1 The paper entitled 'Strategies for Curriculum Development in U.K.' was delivered by Dr. G. Van Praagh. He traced the background of the Nuffield Science Teaching Project to illustrate strategies for science curriculum development. Initiative of the teachers coupled with financial assistance from Nuffield Foundation had made the project feasible. Dr. Van Praagh concluded that each country should work out its own strategies for curriculum development.

3.8 Paper entitled "Why Should We Teach Science to Children?"

3.8.1 This paper 'Why Should We Teach Science to Children?' was presented by Dr. A. H. Livermore. He emphasized the importance of providing learning experiences in science that would help children develop scientific modes of thought. He also suggested that children should be encouraged to apply these scientific modes of thought to a wide range of human problems.

3.8.2 During the discussion doubts were raised as to whether scientific modes of thought should be developed only in teaching science, and whether, indeed, it would be best not to divide the school curriculum into subject disciplines. It was suggested that school curriculum should be based on areas of studies rather than subject disciplines. Dr. Livermore agreed to the area-approach.

3.9 Paper entitled "Needs of Programmed Instruction and Strategies for Curriculum Development."

3.9.1 The paper entitled 'Needs of Programmed Instruction and Strategies for Curriculum Development' was presented by Dr. J. P. Wilkins.

3.9.2 During question time, it was pointed out that as Programmed Instruction was a very costly venture, it would not be advisable for SEAMEO countries to introduce this method of instruction without undertaking a feasibility study.

4. Presentation of Country Papers by Delegates

4.1 Paper entitled "Strategies of Curriculum Development for Laos: The 'Comprehensive School' Project"

4.1.1 The delegate from Laos reported that Laos had been experimenting with comprehensive schools in secondary education designed to "train both the mind and the hand." These schools were characterized by:

(i) the use of national Lao language as the language of instruction

(ii) greater practical orientation of curriculum

(iii) greater involvement of students and parents in school programmes.

4.1.2 During the discussion, Malaysia reported that it had also built a number of comprehensive schools since 1965. The major difficulties were high cost of equipment and shortage of suitably qualified teachers.

4.2 Paper entitled "Attempts in the Field of Reviewing the Curriculum in the Khmer Republic"

4.2.1 The delegate from the Khmer Republic reported that review of primary and secondary education curriculum was receiving urgent attention in his country.

4.2.2 During question time, it was disclosed that parents who joined Parent Teacher Associations helped to finance various school projects, e.g. building of school workshop. There was much more community interest than the government could handle. The snag was that the Government was not able to produce sufficient teachers to cope wih the situation.

4.3 Paper entitled "The Educational Infrastructure Affecting the Choice of Strategies of Curriculum Development"

4.3.1 The delegate from Indonesia dealt with infrastructure for the selection of alternative strategies for curriculum development. Between the member countries and within Indonesia itself, there were differences in the constraints and as such the strategies of curriculum development may vary from country to country and from place to place. Several conditions in the infrastructure were mentioned, which call for different strategies in curriculum reform.

4.3.2 It is most important for RECSAM to know the difference of educational infrastructure of each country, because these differences may need different solutions and strategies. RECSAM should ask questions more relevant to the various conditions in each member country.

4.4 Paper entitled " Strategies for Curriculum Development in Vietnam "

4.4.1 The delegate from Vietnam reported that Vietnam had been undergoing a slow process of curriculum development. It is now making necessary preparations for a thorough change in curriculum based on the changing requirements of the society.

4.5 Paper entitled " Strategies for Curriculum Development in Thailand "

4.5.1 The delegate from Thailand presented some major issues which called for the need for curriculum improvement :—

(i) Lack of relevance of curriculum to existing social economic conditions.

(ii) Need for the development of manpower.

(iii) Need for the promotion of scientific technology in education.

(iv) Problems in implementing the curriculum.

4.5.2 Many strategies including old curriculum analysis were under consideration to solve these problems. The recommended strategies in curriculum reform from the old curriculum analysis working group would be considered carefully by the curriculum committee to solve these problems. A Centre for Curriculum Development was being formed in Thailand. This Centre would be responsible for curriculum reforms and research.

4.6 Paper entitled " Strategies for Curriculum Development in the Philippines "

4.6.1 The delegate from the Philippines reported on some of the earliest curriculum projects undertaken by two of the major educational agencies in the Philippines, namely the Bureau of Public Schools and the University of the Philippines

(Science Education Centre in particular). These projects had culminated in a truly national science education programme in the Philippines.

4.7 Paper entitled "Strategies for Curriculum Development in Singapore"

4.7.1 The delegate from Singapore reported that a standing committee, known as the Advisory Committee on Curriculum Development, had been established in his country in 1969 to advise the Minister of Education on all matters pertaining to curriculum development. Syllabuses for the first 4 years of the primary education in Singapore had been revised.

4.8 Paper entitled "Strategies for Curriculum Development in Malaysia"

4.8.1 The delegate from Malaysia reported on a number of strategies currently being adapted for curricular renovation and innovation in Malaysia. He also reported that the National Educational Development Centre was being formed by the Ministry of Education. When the Centre became fully operational, it would be responsible for the development and implementation of all curricular programmes in Malaysia.

5. Presentation of Paper by Representative, Department of Education, Hong Kong.

5.1 Paper entitled "An Observer's View from Hong Kong"

5.1.1 Mr. W. Fisher-Short, an observer representing the Department of Education, Hong Kong, reported that the provision for primary and secondary school places in Hong Kong had been increasing at an unprecedented rate. This had brought with it many problems including curricular problems. Mr. Fisher-Short's view was that curriculum development should be related to the total educational scene. It should also be seen as an integral part of social development. A possible strategy would be to utilize, as in Hong Kong, the Advisory Inspectorate as the on-going organizational structure for implementing curricula development.

6. Overview of Scope of Working Groups

6.1 The Research Adviser of RECSAM gave an overview of the scope of the Working Groups. The participants were then divided into two Working Groups to discuss and recommend strategies for curriculum development in Southeast Asia with particular reference to the organizational aspects, the curriculum design aspects, and concerns which underlie both the organizational and design aspects. Each Working Group comprised one delegate from each member country, guest speakers, observers and members of RECSAM's professional staff. Suggested guidelines for the Working Groups were contained in the working paper, 'An Overview' (Appendix III).

III. SEMINAR WORKING GROUP SESSIONS

1. The two Working Groups separately deliberated on the various aspects suggested. Reports of the findings and recommendations of the Working Groups appear as Appendices IV and V.

IV. PLENARY SESSIONS VI-VII

1. The two reports of findings and recommendations of the Working Groups were tabled for discussion at Plenary Session VI. As a number of the recommendations submitted by the two Working Groups were similar, a special committee was appointed to harmonize the recommendations and submit them for discussion and adoption at the final Plenary Session.

RECOMMENDATIONS OF WORKING GROUPS I AND II

Introduction

What follow are the combined Recommendations of Working Groups I and II and the supporting rationales for these Recommendations. The Recommendations have been re-organized in the interest of logical presentation but have not been altered in any way. Supporting rationales for the Recommendations have been synthesized from the statements of Accepted Conditions, Concerns, and Discussions of Main Points, previously reported by the Working Groups. Where necessary for clarity some of the rationales have been reworded or amended.

In every case the aim in preparing this draft document has been to retain the intent and wordings expressed by the Delegates from the Member Countries, and from those Observers and Guests invited to contribute to the Working Groups.

The Recommendations and supporting Rationales are presented under five headings :

1. Special Recommendation
2. Communication
3. Survey and Research
4. Services and Functions
5. Courses and Seminars

1. Special Recommendation

1.1 That RECSAM convey to SEAMEO member countries its recommendation that funds in each country be ear-marked in the national education budget for curriculum reform.

Rationale :

Financial resources are a pre-requisite to curriculum reform. Without provision in the national education budget, funds cannot be specifically allocated for curriculum reform.

2. Communication

2.1 RECSAM activities should be designed for the specific needs of the SEAMEO member countries. Possible strategies for RECSAM should not be confined to projects or courses solely at RECSAM. Some problems may be better attacked by RECSAM away from Penang.

As a first step, RECSAM should make known to member states its provisions for short-term consultant services in member countries.

2.2 RECSAM should ask member countries to form institutions and/or to strengthen existing ones which function as communication channels between RECSAM and the country, particularly with respect to recommendations on RECSAM's function as a clearing-house, and RECSAM's newsletter.

2.3 That RECSAM prepare a directory of experts in curriculum development and educational planning who are resident in SEAMEO countries.

Rationale :

In order for a member country to benefit from services which RECSAM can make available, it is first necessary that governments of the member states be knowledgeable about the range of services and resources that RECSAM and other SEAMEO countries offer.

3. **Survey and Research**

3.1 RECSAM should **follow up** the Seminar for Senior National Administrators with a survey of current problems and strategies for curriculum development in science and mathematics in member countries.

Rationale :

A pitfall common to many projects is that once initiated they are not followed through to provide the continued and supportive communication necessary to their success. It is with this understanding in mind that this recommendation is made.

3.2 The **RECSAM staff** should investigate strategies for curriculum reform, and **prepare a paper** that can be circulated to SEAMEO countries which will :

(a) identify and explain those elements of curriculum reform strategies which can be applied to curriculum work, irrespective of the country or region in which it is undertaken.

(b) identify and explain those elements of curriculum reform strategies which are specific to particular problems found in different countries and indicate how such special strategies can be applied.

Rationale :

There is a need in the region for a document that can be used by individuals responsible for curriculum reform that would offer guidelines to strategies that could be employed in their work. Because the initial draft of such a working document might be prepared more efficiently by those experienced in curriculum reform work rather than through a seminar or course, it seems appropriate to have the RECSAM staff undertake this task.

3.3 RECSAM should investigate the role of examinations in curriculum reforms and suggest ways for the improvement of examinations—internal and external—to support curriculum reform.

Rationale :

The nature of present examinations and the administrative procedures used to implement them are often obstacles to curriculum reform. Examinations both internal and external frequently control the curriculum rather than being controlled by the curriculum.

3.4 RECSAM should investigate the ways and means to individualize the education of children.

Rationale :

Schools and school curricula are not the sole mechanisms involved in the education of children. Parents can play an important role in the education of their children and perhaps in providing for individual differences in learning. RECSAM can help the SEAMEO member countries by investigating such questions as :

(1) how parents can support the science and mathematics learning experiences provided in schools,

(2) the use of programmed materials as a means of individualizing instruction in science and mathematics,

(3) the use of educational radio or television, including supportive back-up materials.

4. Services and Functions

4.1 The RECSAM newsleter should be frequent and regular describing activities in member countries, RECSAM activities, and the results of RECSAM's investigations and research projects.

4.2 RECSAM should function as a clearing-house of information on curriculum research and development in science and mathematics for SEAMEO member countries.

(i) A data bank (or file) of sample test items used to assist in the evaluation of the progress of students in new curricula being implemented in the SEAMEO member countries should be established by RECSAM.

(ii) RECSAM's newsletter may be useful for the clearing-house function

4.3 RECSAM should investigate the pooling of specific resources within existing SEAMEO Centres, such as INNOTECH and RELC, to provide a mechanism to enable SEAMEO countries to be sensitive to needed educational changes.

Rationale :

Communication of information that can help curriculum reform workers avoid redundancy and allow for utilization of valuable experience gained elsewhere in the Region is an important Service that RECSAM can provide to SEAMEO member countries, where human and material resources are relatively scarce.

4.4 Bearing in mind the hypothesis that there is no conflict between culture and the inquiry approach, nevertheless, the study of the mutual influence of one on the other needs to be investigated by member countries in cooperation with RECSAM if requested.

4.5 RECSAM needs a sociologist on its staff as well as consultant services from economists.

Rationale :

The infrastructure of education presents many inter-related economic and social conditions which influence the teaching and learning of science and mathematics. Strategies for curriculum reform depend on complex analysis of these conditions. Systematic analysis of such conditions involve consideration of sociology and economics, as well as science and mathematics education. For this reason, a Sociologist, especially one with training and understanding of educational problems, would considerably strengthen the services RECSAM could offer. Among the concerns which call for investigation are :

(1) That educational problems be considered from a national point of view, not in isolation, so that in planning for educational reform, there will be a balance between the demands of the educational sector and those of the other sectors of the economy.

(2) That not enough attention is paid to socio-cultural factors that may influence learning.

(3) That funds and trained personnel are essential to initiating and implementing curricular reforms.

(4) That newly trained teachers, due to the pressures of traditional methods, are not able to put into practice new ideas which they learn in teacher training institutions.

(5) That teachers' low salaries necessitates multiple jobs which allow no time for their professional improvement.

(6) That there is a conflict between the demands of the government for immediate implementation and the demands of curriculum developers for systematic analysis and tryout.

(7) That there are communication gaps among and between top, middle, and lower level educators with regard to conflicts in philosophies, needs, demands, and time constraints.

(8) That there is often poor communications owing to the geography of a country.

(9) That public administration is not sufficiently flexible.

(10) That infrastructure of education tends to be neglected by curriculum developers.

(11) That policies of "social justice and equality" that may require expansion of quantity of educational provision should be in harmony with improvements in the quality of curriculum reforms.

5. Courses and Seminars

5.1 RECSAM should offer courses on new curricular developments in science and mathematics to principals or heads of teacher training institutions.

5.2 RECSAM should offer courses and/or seminars for teacher educations and for Teacher Trainers.

5.3 RECSAM should attack the problem of examinations by

(i) Offering a course/courses for Examiners to acquaint them with the new curriculum programmes, and to assist them in the formulation of test items that reflect the new programmes being implemented in their countries.

Rationale :

Courses offered to selected participants from various levels of educational systems of SEAMEO member countries can be an effective method for RECSAM to assist in increasing the pool of skilled curriculum reform workers in the Region. The courses recommended for inclusion in those offered by RECSAM are intended for this purpose. Among the specific concerns which have given rise to the recommendation for these courses are :

1. That there are inadequate human resources, both in quantity and leadership exceperiences in the Region.
2. That teachers often are not aware of modern methods of presenting old ideas.
3. That curriculum reform should be carried out in consultation and co-operation with schools, teacher training institutions, and members of examining bodies.
4. That teachers, teacher educators and members of examining bodies who are uninformed about the philosophy, rationale, and strategies of curriculum reform can be major obstacles to implementation of new programmes.
5. That examiners be involved in the procedures of curriculum design and development.
6. That pre- and in-service courses for teachers designed to introduce and/or to increase their understanding of curriculum reforms do not usually include work in evaluation and measurement.
7. That the area of responsibility for curriculum reform be so structured that the curriculum developers and the examiners both report to the same higher authority.

5.4 That RECSAM take the initiative in organizing a meeting of representatives of agencies that are presently providing funds and other assistance for curriculum reform to SEAMEO member countries in order to :

(a) identify the kinds of curriculum reform work which are being supported by external assistance.

(b) identify curriculm reform programmes that may be redundant.

(c) identify aspects of curriculum reform programmes that could benefit from a pooling of external resources.

(d) promote co-operative efforts between RECSAM and other agencies in the use of their staffs and facilities for short courses, seminars and other programmes.

(e) co-ordinate through SEAMEO Secretariat the granting of fellowships, scholarships and other study awards that are being made to promote educational reform in SEAMEO member countries.

(f) increase access to research and educational data on pertinent educational problems in the SEAMEO member countries.

Appendix I

WELCOMING ADDRESS

by

Mr. Chin Pin Seng
Director, RECSAM

Yang Berbahagia Enche' Ishak bin Haji Pateh Akhir, J.M.N.
Chairman, Governing Board, RECSAM.
Distinguished Delegates,
Ladies and Gentlemen.

It gives me great pleasure to extend on behalf of the Centre our sincere greetings and warm welcome to all our guests and delegates especially those who are new to Penang. We are highly honoured to have with us Enche' Ishak bin Haji Pateh Akhir who has kindly consented to declare the Seminar open. RECSAM is very fortunate to have Enche' Ishak as Chairman of the Governing Board. Although he is fully occupied with his heavy schedule of work as Deputy Secretary-General of the Ministry of Education, Malaysia, he is always ready to give his services and advice to RECSAM whenever needed. We are most grateful to him for his full support and co-operation with the Centre's policy, programmes and activities.

RECSAM provided nine leadership training courses on the modernisation of science and mathematics curricula at primary and secondary levels for over 180 key educators from all the eight SEAMEO countries last year. I am glad to state that reports of staff visits to member countries at the end of last year as a follow-up of our courses are most encouraging. Quite a large number of key personnel trained at RECSAM are actively involved in various aspects of curriculum development work. There is better understanding of the role of RECSAM among the high officials of the Ministries of Education of member countries. This augers well for the future.

Strong and continuous support from national authorities at the top to the planning and implementation of their national and regional programmes in science curriculum reforms is vital to the success of the movement. This will come faster if opportunities are provided to top level administrators and directors of education in Southeast Asia to understand the latest educational development in other parts of the world and to recognise the immense benefits that such development will bring to their peoples and their countries and lastly to see for themselves valuable leadership training we are now giving to 48 key educators from the region in elementary science and mathematics.

These then, distinguished delegates, ladies and gentlemen are the main reasons for holding this regional seminar for the second time for high officials of SEAMEO Governments and top level educators in the region.

The theme of the Seminar is 'Strategies for Curriculum Development in Southeast Asia'. It is obvious that curriculum cannot be developed in a vacuum. It will be influenced by the society for which it is designed. Hence, it is significant that the strategies are to be developed for the Southeast Asian countries.

In the context of Southeast Asia, children go to schools in order to pass examinations (external and internal) rather than to get educated. Undue emphasis has been placed on paper qualifications by parents, teachers, schools and employers so much so that children are obsessed with examinations. Success in examinations are passports to better educational opportunities, employment and job advancement.

It is true to say that by and large examinations are an important factor in education but it is sad to note that they dominate the whole education process in Southeast Asia.

Teachers teach pupils what the examinations will ask of them and naturally they will learn that much to pass the examinations. Whether they will understand what they need to learn is not important because present school examinations test pupils on recall of facts. It is important to realise that pupils can easily score high marks in examinations by mere memorization of facts!

Success in examinations is accepted as success in teaching. Not much progress has been achieved in curriculum development in the past decade by countries in Southeast Asia. It is probably true to say that such a state of affairs could be due to the fact that most external examination boards set papers based on existing syllabi and will not co-operate with education reformers in providing alternative papers on a pilot basis because of uneconomic returns. Perhaps their examiners were trained in the conventional methods of examination.

Since examinations are so strongly entrenched in the education systems in Southeast Asia we should take advantage of them and use them to stimulate and accelerate curriculum development and improve the quality of education.

How can we reform examinations in order that they can bring their influence to bear on curriculum development and bring about real qualitative improvements in education?

The first requisite is for national authorities to establish very close liaison between the examination boards and those concerned with curriculum development and others concerned with employment, admission policies and selection procedures for secondary and higher education.

It is also necessary to provide training of key examination officers, teacher leaders and teacher educators in new examination and evaluation techniques such as devising tests to assess a wide range of educational outcomes; to assess achievement of various curriculum objectives; to assess aptitudes for selection purposes and to test whether pupils can apply and think for themselves in real-life situations.

Pre-service and in-service courses for teachers should include training in new testing techniques and their application in class tests so that they can use such techniques to assess the success in the use of new ways of teaching.

It is suggested that consideration be given to the beneficial influence of examinations on curriculum development when strategies are mapped out in this workshop.

Before I conclude I would like to thank our distinguished delegates and guest speakers and observers for their participation in the Seminar.

Appendix II

Opening Address

by

Mr. Ishak bin Haji Pateh Akhir
Chairman, Governing Board of RECSAM

The Director of RECSAM,
Distinguished Delegates,
Ladies & Gentlemen,

I should like first of all to thank the Director of RECSAM for giving me the privilege to address this distinguished gathering of Directors of various educational enterprises and top level administrators from all the eight SEAMEO member countries. I should also like, on behalf of the Governing Board of RECSAM, to extend our warm welcome to each and everyone of you participating in the seminar and hope that your short stay with the Centre will be both profitable and enjoyable. RECSAM's permanent home is still under construction and it is expected that the first phase of the building programme comprising a hostel block, a dining and administrative block and staff quarters will be completed by next month. In the meanwhile, it has to operate in borrowed or rented premises. In such circumstances, I hope that you will bear with us should there be any shortcomings in the seminar arrangements.

Ladies and Gentlemen,

During the past two decades, there has been a tremendous expansion in school enrolments in the new developing countries. Some have described it as being phenomenal. Others have said that it has no precedent in history. According to a document prepared by UNESCO in 1971 for the Third Regional Conference of Ministers of Education and Those Responsible for Economic Planning in Asia, the total student enrolment at the First Level of education in the Asian region increased from 71,706,000 in 1960 to 109,078,000 in 1968 and at the Second Level from 16,702,000 to 32,275,000 and at the Third Level from 1,852,000 to 4,361,000. It is also stated that Philippines, Singapore, Thailand, Ceylon, Taiwan, South Korea and Malaysia combined enrolled in 1968, 30.6 million of their 63.9 million population in the age group between 4 and 25 in all the three levels of education. The figure 30.6 million represented 47.9% of their young population.

By and large, however, this fast pace of enrolment expansion took place within the existing framework of education. Educational policy was more in the nature of a response to aspirations and pressures that arose from a rapidly changing social and political situation rather than a positive approach defining the aims and purposes of education in the newly emerging economic, social and cultural context, and devising the structural and curricular means for achieving them. This is not to say that no efforts at all have been made to effect changes. Generally, however, curriculum development was carried out along traditional practices. Committees of educators and teachers, formed on an ad hoc basis, decided what subjects were to be taught at certain levels and what amount of instructional time should be allotted to each subject. Syllabi and course outlines were prescribed and examinations based on the content were set. Some qualitative improvements were also made. However, education being a complex social phenomenon, such piece-meal efforts cannot, be said to be satisfactory.

Whilst therefore the fast pace of enrolment expansion did meet somewhat the demand for education, it also helped to bring forth a large number of formidable problems such as the imbalance in educational opportunities between rural and urban children, the rising rate of under-employment and unemployment amongst the 'educated' below the age of 21, the high wastage rate and the drop outs with their attendant social problems, the growing shortage of skilled, scientific and technical manpower for economic and social development, the widening gap between the education system and the economy and the growing demand on the limited financial resources. It is not, of course, altogether correct to say that these problems are wholly attributable to educational development not being matched by structural and curricular changes in the education system, but it is fair to say that it is one of the major causes.

This seminar on strategies for curriculum development is therefore very significant and timely. Past experience has demonstrated that there is an urgent need for each country to examine the existing structure of its educational system in order to adapt it to the realities and the changing needs of educational development in the coming years. The problem is all the more urgent in view of the fact that more than 60% of the population in this region are in the age group below 21 years and this figure is growing at an alarming rate of 3% a year. According to the UNESCO document, the increase in the primary school enrolment in the world by 1980 would be in the order of 185.4 million out of which 101.5 million would be in the Asian region.

Besides the problems which I have already alluded to there are many other reasons why there is an urgent need for every country in the region to review its education system. As an independent country it is natural that there should be a new emphasis on her own national history and character. There is also a need to strengthen national and social cohesion. Much of the burden for bringing such goals to reality quite naturally falls upon the schools and if schools are to carry out these changes, there must be widespread curriculum reform. Then there is the unprecedented explosion of knowledge. We are told that the amount of information available to the literate world doubles each 15 years or so. The question to be looked into therefore is: "Of all the knowledge in the world, what parts should be taught in what kind of schools?" It is impossible to keep pace with this explosion of knowledge by adding new subjects or topics to the school curricula. Perhaps attention should be given to the selection of basic concepts and methods of learning disciplines that will equip a child with the necessary development of understanding, skills and knowledge that will fit him in his world of tomorrow. Then there is this rapid growth of population. The fact that such a large crowd of learners have been pushing and will continue to be pushing into the schools would perhaps necessitate the development of new approaches to administering schools and to teaching large groups. Should school hours be shortened and self-instruction programmes be taken home for study? The expansion of education enrolment has also altered in a fundamental way the composition of student population bringing into schools, pupils whose interests, abilities and environmental background represent a wide range of variation. This deversification of student population will continue to grow. Should not there be an adjustment to the contents and methods of education to meet this wide range and variety of learning ability and aptitude of the pupils? The next question that could perhaps be asked is: How far should educational institutions be expected to prepare the nation's workers? There is at present an imbalance between the skilled manpower requirements of the national development and the quality of what the educational system produce. This mal-adjustment between the educational system and the realities and needs of the economy is glaringly underlined by the fact that the countries which have the problem of educated unemployed continue to have also shortages in important categories and levels of skills.

I am not an educationist and I therefore do not venture to answer these questions. I am sure that you as responsible and top level administrators and directors in the educational field would be in a better position to discuss them and to suggest the necessary solutions.

Education in a developing country is by far the largest national undertaking and any reform movement would mean total involvement of thousands of personnel in this sector over an appreciably long period. Countries in South-east Asia, realising their limitations, have pooled their resources together and formed the South-east Asian Ministers of Education Organisation with the main objective of accelerating the modernisation of their education systems through regional co-operative efforts. The philosophy of SEAMEO is that problems of South-east Asian countries can best be solved by South-east Asian themselves. The regional seminar today is the second to be convened by one of its centres, RECSAM, in order to bring together senior national administrators and education experts from all its member countries to work out realistic short and long-term strategies for curriculum development in our countries, taking into consideration various national constraints, our national resources, available services of SEAMEO Centres and other international agencies.

This is not an easy task to accomplish. I am confident, however that with your determination, interest, wisdom and expertise, a workable plan can be formulated. I wish you the best of success in your deliberations.

I now have much pleasure in declaring the Seminar for Senior National Administrators open.

Appendix III

AN OVERVIEW

- underlying theme
- anticipated product
- structure of seminar
- scope of working groups
- points for discussions
- recommendations of 1971 Seminar for Senior National Administrators
- objectives and description of seminar

UNDERLYING THEME : Strategies for curriculum development in science and mathematics (both on the school level and the teacher training level).

ANTICIPATED PRODUCT : Recommendations of alternative strategies for continuous reform of science and mathematics curricula in Southeast Asian countries.

STRUCTURE OF SEMINAR :

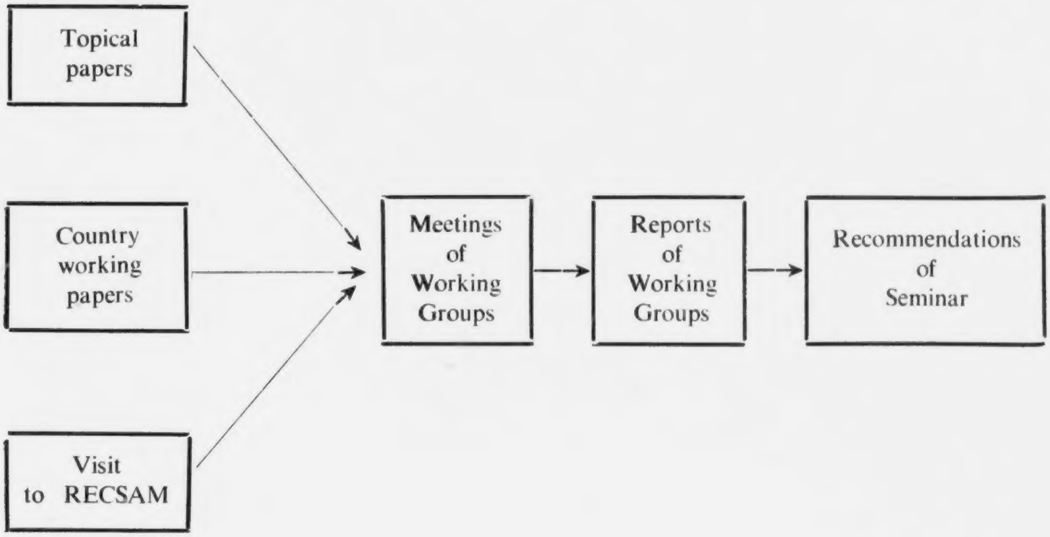
Topical papers
Country working papers
Visit to RECSAM
Meetings of Working Groups
Reports of Working Groups
Recommendations of Seminar

FIGURE 1

SCOPE OF WORKING GROUPS

Both Working Groups I and II have the same scope. However, their individual approaches may differ considerably. So may their products.

A suggested scope for each Working Group is :

Strategies for Curriculum Development (at the school level and the teacher education level)

1. **Organizational aspects**—strategies at the national, state, and district levels
2. **Curriculum design aspects**—the content, techniques, and research support required for
    - (a) determining the national goals and objectives for science and mathematics,
    - (b) designing the learning situations and teaching strategies,
    - (c) evaluating the curriculum and its elements.
3. **Concerns which underline both organizational and design aspects**

Discussion and action within the meetings of each Working Groups may find some stimuli in the following points for discussion.

Organizational Aspects

1. What administrative techniques and structures are required for designing and implementing new curricula in science and mathematics?

2. Who should be involved in curriculum development? In what ways? Who makes what decisions? What regional, national, and international resources should be enlisted?

3. Are the strategies for curriculum development on the national, state, and district levels discrete or inter-related strategies?

4. What mechanisms can be used to identify resources and constraints?

5. When and how can systematic feedback be used?

6. How does the language of instruction in science and mathematics influence curriculum design and implementation?

7. How critical is the time-phasing of curriculum change?

8. What are the major obstacles to curriculum reform? How can they be minimized?

Curriculum Design Aspects

1. How do you know when a curriculum should be changed?

2. What procedures are useful for specifying the educational goals and instructional objectives in science and mathematics?

3. As societies change, some educational objectives change. How can a curriculum be kept up-to-date?

4. What mechanisms enable translation of objectives into learning situations and teaching strategies?

5. When should a country **adopt** a foreign curriculum? **adapt** a foreign curriculum? **invent** their own curriculum?

6. What can be adapted? What cannot be adapted?

7. What kind of interface exists between science and mathematics curricula? between primary and secondary levels?

8. How can the examination system be used to support curriculum reform?

9. To what degree is evaluation of the curriculum compatible with the current examination practices?

10. How can a curriculum deal with the individual differences of the students?

11. How do you insure that what is actually taught in the classroom and how it is taught is compatible with the intents of the curriculum developers?

Concerns underlying organizational and design aspects

The new methods of teaching science and mathematics have several characteristics which may or may not be compatible with existing situations in Southeast Asia. The degree of compatibility influences both the organizational and design aspects of the strategies of curriculum development.

In Figure 2 is a matrix of characteristics of new teaching methods vs. existing situations in Southeast Asia. The row headings represent some characteristics of the new teaching methods in science and mathematics. The column headings depict several existing situations in Southeast Asia.

For each empty square in the matrix we can ask two questions:

1. To what degree is there compatibility between the characteristic and the situation?

2. If little compatibility exists, what action should be considered?

Some Characteristics of New Methods of Teaching Science and Mathematics / Situations	Southeast Asian Cultures and Traditions	Examination Practices	Manpower Needs	Current Classroom Practices	Current Classroom Resources	Current Teacher Education Practices
Students have active roles in the learning situation rather than passive roles						
Students are involved with real objects and materials rather than pictures, models, or narrative accounts						
Students engage in inquiry into ideas, applications of intellectual processes, or current problems						
Students are asked to examine **in a new setting** an idea, an application of an intellectual process, or a current problem which has been previously studied						
When students do not learn the fault lies in the design of the instruction						

FIGURE 2

RECOMMENDATION OF THE SEMINAR

extracted from Report of Seminar for Senior National Administrators
(P5/SCMS/25)

GUIDELINES ON PLANNING FOR NATIONAL SCIENCE EDUCATIONAL REFORMS IN SCHOOLS

1.1 That each member country reaffirms its commitment to the need for continuing emphasis in science and mathematics education as essential to national development.

2. Co-ordination and Implementation of National Programmes

2.1 That each member considers the setting up of an appropriate organisation at the national level to perform the following functions :

2.1.1 to coordinate efforts in the development of science and mathematics education.

2.1.2 to maintain close liaison with RECSAM.

2.1.3. to initiate such activities as may be necessary, to improve science and mathematics teaching in schools.

3. Curricula Reforms

3.1 That each member country may review and re-examine the school curricula with a view to ensuring that the teaching of science and mathematics is given due importance at the appropriate levels.

3.2 That in reforming the science and mathematics curricula, due attention be paid to :

(i) the needs of the growing child in relation to his environment,

(ii) meeting the current and changing needs of the community.

(iii) a rational choice of meaningful topics and activities.

3.3 That in order to achieve the objectives of curricula reforms in content and methodology, consideration be given to the adaptation of new approaches to science and mathematics teaching as exemplified in the courses conducted by RECSAM.

4. Teaching Materials and Logistics

4.1 That for an effective implementation of the science and mathematics reformed programmes, each member country be aware of the necessity for the development of suitable instructional and learning materials.

4.2 That special attention and due priority be accorded to the provision of logistic support for effective implementation.

5. **Training Programmes**

5.1 That each member country be aware of the importance of providing in-service training for teachers and re-orientation programmes for teacher educators, supervisors and administrators for any reforms to be introduced to the science and mathematics curricula. In this regard, it is also important that teacher-training programmes be also suitably re-orientated.

GUIDELINES ON PLANNING FOR RECSAM'S ROLE IN SCIENCE EDUCATION REFORMS IN SOUTHEAST ASIA.

1. **Staff Organisation and Management of RECSAM**

1.1 It is recommended that members nominated to the Governing Board should be officials who are in positions to implement policies and to utilise trained key personnel.

1.2 In order to enhance the effectiveness of the regional character of the Centre and the programmes, it is recommended that the present composition of the directorate be enlarged to include, in addition to the Centre Director and Deputy Centre Director, the Heads of the following divisions :—

Training
Research
Special Services and Information
Administration

2. **Training Courses**

2.1 In addition to common courses provisions should be made for courses relevant to the needs of the individual countries from which the participants come.

2.2 As the courses are conducted in English, in order that maximum advantage could be derived from them, it is suggested that participants who need to improve their proficiency in English, the following measures be taken :

2.2.1 Nominate participants early enough to enable them to take an accelerated course in English before leaving their home countries.

2.2.2. Send such participants to RECSAM to undergo an intensive refresher course in English before a course starts.

3. Research

It is recommended that the extent to which the training and techniques acquired by the participants are being successfully applied, be assessed.

4. Information and Clearing House

4.1 Newsletters and publications of RECSAM should not only be sent to the Ministries of Education of member countries but also to various institutions and organisations concerned.

4.2 It is recommended that RECSAM in all its publications should include information regarding all available financial and technical assistance from international agencies.

8. Special Services

Regarding consultant services to be provided by RECSAM to member countries, most member countries highly appreciate the offer, but feel that they will not be able to afford to pay for the travel and per diem allowances of the consultants. It is recommended that RECSAM requests funds from SEAMEO to fulfil this function.

9. Co-operation with International Agencies and Institutions

It is recommended that RECSAM make necessary representations to all international agencies in this region regarding adjustments to programmes giving due emphasis to new approaches in science and mathematics teaching.

GENERAL RECOMMENDATIONS

The aims and objectives of the RECSAM Seminar for Senior Administrators, as stated by its Director are to give the senior government and administrative officials in this region the opportunity :—

Firstly, to understand new developments in Education and to recognize their potential benefits to their countries, so that they can give positive support to the planning and implementation of their national and regional programmes in science and mathematics curriculum reforms;

Secondly, to see for themselves how the programmes are conducted in RECSAM and

Thirdly, to map out guidelines for the improvement in communication and co-ordination of national and regional efforts in our common task of developing suitable curriculum reforms for the region

Mindful of the above objectives of RECSAM and the spirit of the SEAMEO Charter to help participating countries to improve the teaching of Science and Mathematics in the region, the participants of this Seminar recommend :

1. that curriculum reforms in science and mathematics should meet the criteria of relevance without sacrificing balance to ensure the total development of the child in his environment.

2. that planners and administrators have a clear and proper perspective of long-term goals for scientific literacy,

3. that systems analysis be used wherever applicable,

4. that the educational problems of the region be studied at the micro-level,

5. that member countries carry out more extensive and intensive educational planning,

6. that the SEAMEO countries strive towards close relationship in their endeavour towards science and curricular reforms,

7. that comparative standards to be prepared by RECSAM to serve as guides for curricular reforms.

8. that greater efforts be exerted in the promotion of curriculum reforms in science and mathematics,

9. that greater professionalism be fostered among educational administrators and teachers,

10. that there should be total involvement of the public and private sectors within the SEAMEO areas and, where possible, of interested bodies outside this region,

11. that in adopting and adapting curricula the above recommendations be seriously considered by member countries.

PROJECT PROPOSAL ABSTRACT

I. CODE AND TITLE:

TAG-1 Seminar for National Administrators

II. DEVELOPED ON THE BASIS OF PROPOSALS:

BT-4, CT-3 PT, ET-1 (in part)

III. OBJECTIVES AND BENEFITS:

None of the work of the Regional Centre can be effective in meeting the stated objectives of the Centre unless the senior government education administrative personnel involved in the education system and the senior industry commerce personnel involved in each country's developing economy (the actual users of regional science talent): (1) understand the new developments in education well enough to recognize their potential benefits to their own problems and (2) become sufficiently sympathetic to them to actively participate in and encourage the prerequisite changes required for their implementation. It is the objective of this series of seminars to give these people an opportunity to gain that understanding, to exchange viewpoints and to present ideas for future improvements in communication and co-ordination in this regard.

IV. DESCRIPTION:

The seminar will consist of presentations by experienced members of the Centre staff, by consultants from successful projects in more developed countries, and by administrators from education systems where modern curricula have been successfully introduced, which will

(1) demonstrate the techniques, the theoretical (learning-study) background, and the content organization characteristic of modern curricula in science and mathematics at elementary and secondary levels;

(2) discuss the changes needed in examinations and evaluation methods to stimulate more effective learning;

(3) discuss the administrative problems (such as class loads, equipment and facility needs, teacher preparation, etc.) inherent in implementation of the more effective modern methods.

(4) outline the plans of the Regional Centre to assist the member countries in achieving the improvements in science and mathematics education possible at this time;

and (5) solicit inputs from these key people on the methods of implementation of future programmes and in general benefit from their specific National knowledge.

V. DURATION AND PHASING:

One week is probably the maximum time these senior officials could spare.

Appendix IV

REPORT OF THE FINDINGS AND RECOMMENDATIONS OF WORKING GROUP I

by

Dr. Setijadi (Delegate from Indonesia)

Members of the Working Group I

Chairman :	Mr. J. M. Dasbach	
Vice-Chairman :	Dr. Setijadi	
Rapporteur :	Miss Arfah bt. A. Aziz	
Members :	Mrs. Chine Renne	(Khmer Republic)
	Dr. Veo Vanh Homsombath	(Laos)
	Mr. Chew Tow Yow	(Malaysia)
	Mr. Domingo Soriano	(Philippines)
	Mr. Lim Chin Chee	(Singapore)
	Mr. Winai Kasemsestha	(Thailand)
	Mr. Pham Tan Kiet	(Vietnam)
	Prof. Lee Peng Yee	
	Dr. Fatimah bt. Hamid Don	
	Mr. William Fisher-Short	
	Mr. Lim Tang Seng	
	Dr. Marcela Tionko Tating	

This report is divided into four sections :

(1) Introduction

(2) Axiom

(3) Discussion of main points

(4) Recommendations

Introduction

Working Group I felt that it was an advisory committee with no teeth, or at best, only false teeth. Our discussions centred on what are the problems of curriculum development in Science and Mathematics. Often we focused our strategies of attacking the problems in terms of RECSAM, for RECSAM is certainly an element in the possible strategies in Southeast Asia. It may seem that we are passing the buck back to RECSAM, but not without first outlining suggestions on the buck.

AXIOM

EDUCATION IN SOUTHEAST ASIA CANNOT AFFORD TO WAIT FOR EVOLUTIONARY IMPROVEMENT: MAN MUST INTERFERE

QUESTIONS CONSIDERED (as posed in Appendix III)

A. CURRICULUM DESIGN ASPECTS

Question 1. **How does a country know when a curriculum should be changed?**

A mechanism is needed to enable a SEAMEO country to be sensitive to educational changes that are needed. The educational pulse of the nation should be felt. This is a pre-condition for curricular change.

Several questions arise :

a) Whose pulse should be felt? (What are the sources of data?)

b) What are the elements of the pulse? — one element is the changing expectations of the country.

c) When should the pulse be felt? — continually.

d) Who should feel the pulse?

— perhaps a standing committee which consists of advisory (not supervisory) inspectors at the national level.

Question 5, 6. **When should a country ADOPT a foreign curriculum? ADAPT a foreign curriculum? INVENT their own curriculum? What can be adapted? What cannot be adapted?**

A country should **never** adopt, **sometimes** adapt, and **always** invent curriculum programes. Further discussion led to the suggestion that this question is not properly phrased. A better question is : In **designing** a curriculum, what should be adopted, what should be adapted, and what should be invented?

If a country plans to design a curriculum, three questions must be considered :

a. Does it fulfill the needs of the country?

b. Is it in line with national characteristics?

c. Is it consistent with the cultural values of the people?

It may be that **adaption** of a programme be possible in the area of the physical sciences because the concepts are internationally-based. The field of humanities is more nationally-based, thus programmes for humanities should be **invented.**

Question 8, 9 **How can the examination system be used to support curriculum reforms? To what degree is evaluation of the curriculum compatible with the current examination practices?**

First, we must distinguish between examining the student and evaluating the curriculum.

There are three categories of examinations :

a. Examinations for certification

b. Examinations for selection

c. Examinations for assessment

One strategy suggested for improving the compatibility of curriculum and examinations was :

a. Involve examiners in the procedures of curriculum design and development, and

b. Structure the area of responsibility so that the curriculum developers and the examiners both report to the same higher authority.

By including the examiners in the curriculum reform process, a greater chance of revising the examinations may be brought about.

The task of selecting primary school students for secondary school may be transformed to the task of allocating primary school students by the strategy of improving the secondary school curriculum until the need for selection diminishes and the need for allocating the students increases.

Question 10. **How can a curriculum deal with the individual differences of students?**

Individual differences imply more than just achievement of the child. There are three aspects :

a) Different individual levels or expected achievement

b) Individual teaching techniques

c) Different types and content of curriculum programmes.

In Southeast Asia it may be better to try focusing curriculum efforts on small groups rather than on individual learners. To what extent can programmed instruction be of help here? What are the psychological consequences of introducing technological devices in the classroom?

Parents may be a useful resource for curriculum approaches towards individualizing education.

B. ORGANIZATIONAL ASPECTS

Question 1, 2. **What administrative techniques and structures are required for designing and implementing new curriculum in science & mathematics?**
Who should be involved in curriculum development? In what ways? Who makes what decision? What regional, national and international resources should be enlisted?

The group felt that an important question is, is there a counterpart in education to the " market forces " in economics? If so, how might these counterpart forces be released?

The forces of making initiative in education profitable, perhaps by some form of recognition, were suggested as an approximate counterpart to " market forces ".

It is a fallacy to think that the private sector is not involved in education.

Question 8. **What are the major obstacles to curriculum reform? How can they be minimized?**

The major obstacles are :—

1. Teachers who are not receptive to modern methods of presenting old ideas.
2. Inadequate human resources.
    a. quantity
    b. leadership qualities
3. Financial resources
4. Time resources
    a. conflict between the demands of the government for immediate implementation and the demands of curriculum developers for systematic analysis and tryout.
5. Examinations
6. Communications gaps among top, middle, and lower level educators with regard to conflicts in philosophy, needs, demands, and time constraints.

7. Infrastructure of education.

    a. teachers' low salaries (teachers' low salaries beget "moonlighting" and allow no time for a teacher's self-improvement or in-service workshops).

    b. poor communications (some owing to the geography of the country).

    c. rigidity of public administrators.

    (Since the infrastructure of education falls under the concern of the entire government, it tends to be neglected).

8. Dissemination of curriculum programmes to all geographical districts and levels of socio-economic groups.

9. National policies of "social justice and equality". (These policies are aimed at preventing discrimination among different geographical areas, such as urban and rural areas. The effects of these policies are that the different geographical areas tend to request the curriculum to be implemented at exactly the same rate. Such forces go counter to an administrative strategy which calls for different rates of implementation for different geographical areas. Thus, the constraint of social justice and equality may be conducive to future inequalities).

Some strategies for minimizing obstacles are the following :—

1. Ensure that changes being introduced to teachers are acceptable to them and are not imposed on them.
   Changes may have to be introduced in phases according to agreed-upon priorities. All-at-once may be over-whelming.

2. The scheme of Centers of Excellence or Radiating Centers seems to work as a strategy to introduce and try out new curriculum materials. However, regular follow-up (listening and supporting) is critical. The on-going established inspectorate is one agency that might conduct the regular follow-up.

3. The conditions for rapport among the top, middle, and lower levels of education may be created through frequent briefings, as in Malaysia, and perhaps through national, state, and district meetings and seminars. Radio and television must be included as resources (which need back-up) to help overcome the communications gaps between decision-makers and people in the field.

RECOMMENDATIONS

1. Possible strategies for RECSAM should be confined to projects or courses solely at RECSAM, and RECSAM activities should be designed for the individual differences of the SEAMEO member countries. Some problems may be better attacked by RECSAM away from Penang.

2. RECSAM needs a sociologist on its staff as well as consultant services from economists.

3. In line with the educational pulse-taking described earlier, a strategy should be investigated which involves a pooling of specific resources of the SEAMEO centers, such as RECSAM, INNOTECH, and RELC.

4. RECSAM programs should be assimilable in member countries. RECSAM should bear in mind that there is little/no conflict between culture and the inquiry approach.
   Passive participation could be the fear of the unknown and language problems rather than because of cultural inhibitions.

5. RECSAM should attack the problem of examinations
   (1) Investigate the concept of abolishing external examinations and placing the role of examinations into the schools.
   (2) Provide a practical course in the development and analysis of multiple-choice examinations.

6. RECSAM should investigate the feasibility of utilizing parents in the individualization of education for children.

7. RECSAM should carry out the function of clearing house of information on curriculum research and development for the member countries.

8. RECSAM should have frequent and regular newsletters describing current activities in member countries, current RECSAM activities, and the results of RECSAM's investigations and research projects.

9. RECSAM should follow up the Seminar for Senior National Administrators with a survey of current problems and strategies for curriculum development in science and mathematics in member countries.

10. RECSAM should investigate the preparation of sample radio (or TV) programs as part of a curriculum implementation strategy. Perhaps the design of back-up materials supportive of radio/TV programs might be investigated. Some of the back-up materials might be programmed.

11. RECSAM should ask the member countries to appoint an institution which functions as a communication channel between RECSAM and the country, particularly with respect to recommendations 7 and 8.

Appendix V

REPORT OF THE FINDINGS AND RECOMMENDATIONS OF WORKING GROUP II

by

Mr. Phouangphanh Sananikone (Delegate from Laos)

Members of the Working Group II

Chairman :	Prof. Richard Salinger	
Rapporteur :	Dr. W. D. Ponniah	
Members :	Mr. Soenarjo	(Indonesia)
	Mr. Khieu Komar	(Khmer Republic)
	Mr. Phouangphanh Sananikone	(Laos)
	Mr. Tan Teik Beng	(Malaysia)
	Mr. David Tomelden	(Philippines)
	Miss Chua Kah Choo	(Singapore)
	Mrs. Phungchai Sindhvananda	(Thailand)
	Mr. Pham Van Quang	(Vietnam)
	Mr. Lam Kok Hon	
	Dr. Eleanor T. Elequin	
	Mr. Chin Pin Seng	
	Dr. A. H. Livermore	
	Mr. A. S. Everest	
	Mr. Khoo Tiang Lim	
	Mr. Baba Ahmad b. Hamid Don	
	Dr. Lim Chong Keang	

Introduction

During their first meeting members of Group II engaged in a free exchange of views on the major issues suggested in the guidelines prepared for the Working Groups.

At its second meeting, ideas previously exchanged were organized and re-evaluated in order to formalize them into the statements of **Accepted Conditions, Concerns** and **Recommendations,** which appear below

I. Accepted Conditions

1) That there is no unique strategy for curriculum reform.

2) That curriculum reform should be carried out in consultation and co-operation with schools, teacher training institutions, and members of examining bodies.

3) That teachers, teacher educators and members of examining bodies who are uninformed about the philisophy, rationale, and strategies of curriculum reform can be major obstacles to implementation of new programmes.

4) That funds and trained personnel are essential to initiating and implementing curricular reforms.

5) That to be successful, curricular reform movements require the support of top-level educational and national leaders.

6) That to be successful, curricular reform movements require support and acceptance by the public at large.

7) That it is not practical to introduce many new curriculum programmes at the same time.

II. Concerns

1) That educational problems be considered from a national point of view, not in isolation, so that in planning for educational reform, there will be a balance between the goals of education and of other sectors of the economy.

2) That the rationale for new programmes is known by only a few people working at the upper level.

3) That not enough attention is paid to socio-cultural factors that may influence learning.

4) That within the SEAMEO region there is a great shortage of the types of trained personnel required to do curriculum reform work.

5) That newly trained teachers, due to the pressures of traditional methods, are not able to put into practice new ideas which they learn in teacher training institutions.

6) That pre-and in-service courses for teachers designed to introduce and/or to increase their understanding of curriculum reforms do not usually include work in evaluation and measurement.

III. Recommendations

Courses

1) That administrators in teacher training institutions be offered courses on new curricular developments in science and mathematics by RECSAM.

2) That RECSAM offer courses for Teachers of Teacher Trainers, and for Teacher Trainers.

3) That RECSAM offer a course for Examiners to acquaint them with the new curriculum programmes, and to assist them in formulation of test items for the examinations in their own countries, that will reflect the new programmes being implemented in their countries.

Action

1) That RECSAM make known to member states its provisions for short-term consultants.

2) That RECSAM prepare a directory of experts in curriculum development and educational planning who are resident in SEAMEO member countries.

3) That RECSAM convey to SEAMEO member countries its recommendation that in each country funds for curriculum reform be ear-marked in the national education budget.

4) That the **RECSAM staff** investigate strategies for curriculum reform, and prepare a paper that can be circulated to SEAMEO member countries which will :

    a) identify and explain those elements of curriculum reform strategies which can be applied to curriculum work, irrespective of the country or region in which it is undertaken.

    b) identify and explain those elements of curriculum reform strategies which are specific to particular problems found in different countries and indicate how such special strategies can be applied.

5) That a data bank (or file) of test items used to evaluate progress in new curriculum programmes being implemented in the SEAMEO member countries, be established by RECSAM.

6) That RECSAM organize a Seminar of Educational Researchers from the SEAMEO member countries in order to :

   a) exchange information and views on educational research being conducted on problems of countries in the SEAMEO region.

   b) identify problems of educational research in the SEAMEO member countries that might be best investigated by a pooling of resources.

7) That RECSAM take the initiative in organizing a meeting of representatives of agencies that are presently providing funds and other assistance for curriculum reform to SEAMEO member countries in order to :

   a) identify the kinds of curriculum reform work which is being supported by external assistance.

   b) identify curriculum reform programmes that may be redundant.

   c) identify curriculum reform programmes that could benefit from a pooling of external resources.

   d) promote co-operative efforts between RECSAM and other agencies in the use of RECSAM staff and facilities to offer short courses, seminars, and other programmes to participants from SEAMEO member countries, either at RECSAM or in the member countries.

   e) co-ordinate the granting of fellowships, scholarships and other study awards that are being made to promote educational reform in SEAMEO member countries.

   f) increase access to research, and educational data on pertinent educational problems in the SEAMEO member countries.

Examples of Agencies whose representatives might be convened together would be:

UNESCO
UNICEF
UNDP
UN Special Fund for
  Population Activities

CEDO
Colombo Plan
Ford Foundation
Asia Foundation
INNOTECH

Appendix VI

CLOSING ADDRESS

by

Mr. Chin Pin Seng,
Director, RECSAM.

Mr. Tan Teik Beng,
Chairman of the Seminar,

Distinguished Delegates and Participants,

It is significant that the delegates themselves decided not to elect the chairman of both workshop sessions from their own group in order that every delegate could participate freely and actively in these workshops. It is also significant that observers and other participants appreciated the wish of the delegates and those elected as chairmen readily accepted the onerous and unenvious task.

I have yet to come across any international seminar where there has been so much mutual understanding, faith, goodwill and co-operation generated in the past few days among the delegates and other participants, most of whom met each other for the first time at this Seminar. The frank exchange of views, ideas and information reflected the true spirit of regional co-opeartion.

It can be safely said that each and every one of you has benefitted greatly from the Seminar and has at the same time contributed significantly to the development of realistic strategies for curriculum development in Southeast Asia.

RECSAM's primary objective is to serve the needs of the region through regional co-operation and we shall do our best to play our role effectively as a regional catalyst.

We realize the magnitude of the task expected of us as reflected in your recommendations. We appreciate the trust and the faith, you as Senior National Administrators, have in our Centre.

We are confident that with your continuing support, co-operation and encouragement we can achieve our common objectives together.

We are still very short of professional staff. Six out of fourteen academic posts have not been filled. One is to be filled by Malaysia and five of these, including that of Deputy Centre Director by other SEAMEO countries. We appeal to you to persuade your Ministry of Education to nominate suitable personnel for these posts so that you can help us to help you.

On behalf of RECSAM, I would like to thank all of you most sincerely for your wholehearted co-operation and your significant contributions to the success of the Seminar. We beg you to excuse us for any shortcomings in the organization of the Seminar.

In particular our grateful thanks go to Mr. Tan Teik Beng for his able chairmanship of the whole Seminar. Our sincere thanks are also due to Dr. Soriano as Vice-Chairman, Mr. Lim Chin Chee as the Rapporteur-General, and Prof. R. Salinger and Mr. J. M. Dasbach as Chairmen of workshop sessions. We extend our grateful thanks also to Mr. Lim Tang Seng, Chairman of the Organizing Committee, the rapporteurs, other officials and supporting staff for their full co-operation in running the Seminar so smoothly.

Distinguished delegates, ladies and gentlemen, I shall now conclude with best wishes to you all for a pleasant and safe journey home.

Appendix VII

LIST OF PARTICIPANTS

DELEGATES

Indonesia

1. Dr. Setijadi - - Secretary,
Office of Educational Development,
Ministry of Education & Culture.

2. Mr. Soenarjo - - Director,
Technical & Vocational Education,
Ministry of Education & Culture.

Khmer Republic

1. Mr. Khieu Komar - - Dean,
Faculty Pedagogy,
University of Phnom Penh.

2. Mrs. Chine Renne - - SEAMEO Officer,
SEAMEO, Cultural Relations Board,
Ministry of Education.

Laos

1. Dr. Veo Vanh Homsombath Director,
Teacher Training & Educational
Research, and
Director of College of Education.

2. Mr. Phouangphanh
Sananikone - - Chief of Social & Economic Analysis
Service, Commission General of Planning,
Ministry of Planning & Co-operation.

Malaysia

1. Mr. Tan Teik Beng - Chief Education Officer,
Department of Education,
Penang.

2. Mr. Chew Tow Yow - Asst. Director of Schools (Primary),
Ministry of Education,
Kuala Lumpur.

Philippines

1. Mr. Domingo Soriano - President,
Central Luzon Teachers College,
Pangasinan.

2. Mr. David Tomelden - Budget Officer,
Bureau of Public Schools,
Department of Education,
Manila.

Singapore

1. Mr. Lim Chin Chee - Senior Inspector of Schools,
Ministry of Education.

2. Miss Chua Kah Choo - Acting Deputy Secretary,
Ministry of Education.

Thailand

1. Mrs. Phungchai Sindhvananda Director,
Dhonburi Teachers College,
Bangkok.

2. Mr. Winai Kasemsestha - Director,
Finance Division,
Secondary Education Department,
Ministry of Education, Bangkok.

Vietnam

1: Mr. Pham Tan Kiet - Director,
Education Planning,
Ministry of Education.

2. Mr. Pham Van Quang - Head,
Guidance Department,
Faculty of Pedagogy, Saigon.

GUEST SPEAKERS

1. Prof. Lee Peng Yee - Associate Professor in Maths,
Department of Mathematics,
Nanyang University,
Singapore 22.

2. Mr. Lam Kok Hon - Deputy Registrar-General of
Schools and Teachers,
Ministry of Education,
Kuala Lumpur.

3. Dr. Eleanor T. Elequin - Professor & Chairman,
Education Graduate Committee,
College of Education,
University of the Philippines,
Diliman, Quezon City.

4. Dr. Fatimah Hamid Don - Lecturer in Education,
University of Malaya,
Kuala Lumpur.

5. Mr. Joseph P. Wilkins - Language Program Consultant,
Centre for Educational Services,
University of Penang, Penang.

6. Dr. G. Van Praagh - Asst. Director,
CEDO, London.

OBSERVERS

1. Dr. L. R. Davis - - Lecturer in Educational Psychology,
UNESCO, Bangkok.

2. Dr. S. S. Kulkarni - - Consultant,
UNESCO, Bangkok.

3. Prof. H. Nishinosono - Associate Professor,
UNESCO, Bangkok.

4. Mr. William Fisher-Short - Asst. Director of Education,
Chief Inspector of Schools,
Education Department,
Hong Kong.

5. Prof. Richard Salinger - UNESCO Education Specialist,
Ministry of Education,
Kuala Lumpur.

6. Dr. Lim Chong Keang - Lecturer,
Department of Mathematics,
University of Malaya,
Kuala Lumpur.

7. Miss Arfah bt. A. Aziz - Curriculum Officer,
Educational Planning and Research Division,
Ministry of Education,
Kuala Lumpur.

Appendix VIII

ORGANISING COMMITTEE

Chairman :	Mr. Lim Tang Seng	Asst. Director (Training)
Secretary :	Mr. S. Harith	Registrar/Bursar
Secretarial Staff :	Mr. S. Harith	Officer-in-Charge
	Mrs. Ling Eng Kee	Secretary
	Miss Tan Chui Tieh	Secretary
	Miss Lim Ai Chin	Stenographer
	Miss Kam Hee Chin	Clerical Officer
	Mr. N. Balakrishnan	Clerical Officer
	Miss Siti Hindun	Clerical Assistant
	Miss Sakinajan	Typist
	Miss Fathillah	Typist
	Miss Jothy Saravanam	Typist
	Mr. Subbramanian	Office Keeper
	Mr. Khairuddin b. Yeop	Office Keeper
	Mr. Yahya b. Lahit	Office Keeper
Finance :	Mr. Lim Cheam Teong	Financial Assistant
Registration :	Mr. S. Harith	
Public Address System :	Mr. S. Harith	
Conference Arrangement:	Mr. J. M. Dasbach	Research Adviser
	Mr. Khoo Tiang Lim	Training Officer (Sc.)
Rapporteur :	Mr. Baba Ahmad	Information Officer
	Mr. S. Panchalingam	Training Officer (Maths)
	Mr. Khoo Tiang Lim	
Transport :	Miss Tan Chui Tieh	
Reception, Information and refreshment :	Mr. Baba Ahmad	
Tour Arrangement :	Mr. S. Harith	

Appendix IX

RECSAM STAFF:

1. Mr. Chin Pin Seng - Centre Director
2. Mr. Lim Tang Seng - Asst. Director (Training)
3. Dr. Marcela T. Tating - Asst. Director (Research)
4. Dr. A. H. Livermore - Training Adviser
5. Mr. J. M. Dasbach - Research Adviser
6. Mr. A. S. Everest - Adviser, Secondary Science
7. Mr. D. Harper - Adviser, Primary Science
8. Mr. K. J. Watson - Adviser, Mathematics
9. Dr. M. Sudzuki - Adviser, Biology
10. Mr. Khoo Tiang Lim - Training Officer (Science)
11. Mr. S. Panchalingam - Training Officer (Mathematics)
12. Dr. W. D. Ponniah - Research Officer (Biology)
13. Mrs. Vilai Navabusya - Research Officer (Mathematics)
14. Mr. Baba Ahmad b. Hamid Don - Information Officer

ACTION and REACTION

by

Mr. A. S. Everest
Adviser in Secondary Science
RECSAM

Those of you who have studied physics at school may recall from those days Newton's Third Law of Motion, which is usually concisely, and incorrectly, stated as " action and reaction are equal and opposite ". There follows from this seemingly innocent statement a simple paradox. Imagine a bullock pulling a cart. Now, if the bullock pulls upon the cart with a certain force, then it follows that the cart pulls upon the bullock with an equal and opposite force. Thus, there is no net force, and so the bullock can never move the cart. Carry this argument further and you will soon see that nothing can ever move. But, you only have to recall that some hours ago you were asleep in bed without a care in the world and that now you are here listening to me to realise that something or someone is wrong. Uneasily aware of Newton's reputation, you will probably correctly conclude that the mistake is yours and not his. Anyway, you rightly feel sure that in order for a body to begin to move, it is required only that an unbalanced force act upon it. And yet........... and yet, if you have been engaged in work on the implementation of new science curricula, you may have your secret doubts about even this and find some comfort in the paradox which I have presented. For you might have observed that it is quite possible to apply immense forces to the vehicle of curriculum reform and to achieve not the slightest movement as a result. I hope that it remains a vicarious observation and not a personal experience.

Educational administrators from other countries and other regions may tell you how they have succeeded in starting their vehicles rolling, and they will probably not resist the temptation, for such is human nature, to proffer advice to you upon your problems. You may be in time to observe, with a suitable mixture of external appreciation and internal scepticism, their own vehicle careering along its preordained path, pitted and pot-holed and bordered by precipices. Other administrators may acquaint you with the minutely detailed preparations that they are making. Preparations which stretch ever further into the future, always being modified and improved to match a continuously changing situation, and always impeded by the growing complexity of the economic, social and political restraints. A last group might be seen to be standing by, observing and assessing the efforts of others. If their position is one of strength, economic strength at least, then these are the subtle delayers, profiting from the errors and achievements of others. If their position is one of weakness, then they are the despondent, either believing that the task is too difficult or hoping that time will solve their problems for them.

Such different types of administrator or administration have their parallels in military history. In all ages there have been those generals whose action or inaction is analogous to theirs. The first is the general who, basing his strategy upon the relevant information available, acts swiftly and decisively with such force as are at his command. The second is that cautious man, who takes his stand behind a profusion of plans of enviable thoroughness. He knows that he cannot fail: we know that he cannot act. The last is the delayer, who by his masterly inactivity triumphs, or is the man who, overwhelmed or bewildered by the difficulty of his task, through inactivity surrenders victory. I concede that the analogy may not be entirely accurate, but the choice of strategy to be employed by the curriculum reformer is basically the same. And you, you are the generals—or, perhaps not wishing to gain your acquiescence by flattery—you are the chiefs of staff.

In this paper I intend to consider briefly the forces that are most likely to prevent or inhibit curriculum reform—the forces that act when we try to start the vehicle rolling—and to question whether our assessment of them is accurate. Finally, I want to ask what should be our strategy? Which general should be our model?

The forces that influence educational change are many and complex and have their origins in four spheres of influence—the economic, the social, the political and the educational sphere itself. No one force acts independently of the others and all four have a magnitude which varies not only with locality, but with time in a given locality. How often will you have heard these sad facts recited and perhaps experienced their reality? Why then do we go on repeating them across the world to each other? The identification and enumeration of the factors relevant to curriculum reform have been carried out for us with a depressing thoroughness. But have we been beguiled by the grand theories and sophisticated research into minimizing the difficulties? Do we tend to look beyond the profusion of words at a vista of lands full of cheerful, intelligent and obedient children, receiving their worldly education in the nation's interest in schools of unparalleled magnificence, equipped with a profusion of educational aids, staffed by teachers of remarkable ability and imagination, overseen by inspired administrators, controlled by evaluators of perfect equity, confident that those engaged in research have already solved the next problem before it has emerged to mar that idyllic scene? And have others, for their part, been guilty of suggesting that there is only one way to achieve our goal? Only one way to travel to our destination? Use a Rolls Royce—or a Cadillac. To be sure it is an expensive and sophisticated piece of machinery, but it is also the most reliable, most comfortable and most prestigious mode of travel. Few people tell us what to do if we cannot afford such a vehicle. Or do not know how to drive it. Or cannot afford the petrol for it. Or if we haven't sufficient qualified mechanics to maintain it. Or, if we have more passengers than can readily travel in it at any one time. It is essential for us all to make a realistic assessment of the magnitude of the problems and of the resources available to assist in their solution. We must not minimize the difficulties or maximize the resources. Nor can we afford to be sensitive in their assessment.

First, then, let us look at the economic sphere and the forces that operate there. There is a temptation to assume that the only requirement for the solution of the problems associated with implementation of a new curriculum is sufficient funds. Given also time, this might be true, but it is my contention that it is time which is the most significant factor of all. In any case, there are not limitless funds available, nor are there likely to be. This at once presents the prime restriction. Any plan for reform must make sense in terms of the available economic resources. Every Government acknowledges the paramount importance of education—" education is the key to all our progress or failure—social, political, economic." It may, however, be that the pressure for survival that dictates an unreasonably large expenditure on defence. The demands of public health and social welfare cannot be ignored. Yet this very restriction on available funds can also be the driving force for the efficient reform of the curriculum, for economic planners must regard education ultimately in the light of its cost-effectiveness. Related to this are two further economic problems, which spill over into the social sphere. The children that we educate must find employment, and not only employment, but fulfillment. It has already been shown that the two suggested solutions to the problem of the projected unemployment of school leavers, the raising of the school leaving age and an emphasis on vocational training, even if they were economically possible, are by no means certain of success. There is a further danger that education will reinforce the trend towards urbanisation, that the drift of youth from the land to the towns will continue, with disastrous social and economic consequences. Assuming that a satisfactory solution to this problem were found, then the size of the school population will not remain static. More children will be drawn into the educational net, the school leaving age may indeed be raised, either by legislation or by the pressure of the numbers of those qualified to receive higher education, the birthrate will rise. Already I perceive that the size of classes in many countries, both in the East and the West, is not remaining static, nor even decreasing. It is rising alarmingly.

The great force for educational reform in the social sphere is easy to isolate. It is enshrined in the phrases " the fundamental right to education " and " the equality of educational opportunity ". In the realm of science education, specifically, it becomes " the necessity for the community to have some general knowledge of scientific facts and acquaintance with scientific modes of thought. " The opposing forces are no less clear. The cultural traditions of the region are the antithesis of the new methods of teaching science, enshrined in the discovery or investigatory approach. The child is encouraged to question and the teacher to relinquish his position as " authoritarian dispenser of knowledge. " Such a move could undermine the authority and influence of both teacher and parent in the community. It was with real concern that such a parent said to me, about a year ago : " Where will your Nuffield methods lead to? " (I might add, in self defence, that they were not my methods and that my connection with the Nuffield Foundation is tenuous). " Where will your methods lead to? " " You teach our children to question authority : soon, they will be no better than western children. " And while I was pondering the truth of this statement, he added triumphantly. "Why do you think that the students in your universities are so ill-disciplined?" "Why do they riot?" "Nuffield is the reason." I think that perhaps his conclusion owed more to emotion than logic, but he raised a question that demands most careful consideration and whose consequences in their turn carry us over into the political sphere. What are the implications for society of the introduction of these new methods of instruction, which often embody freedom of thought or freedom of action? What are the consequences when general scientific knowledge and modes of thought impinge on traditional cultures? It may be reasonably easy for us here in Penang, or for those in Bangkok, Vientiane, Saigon, Djakarta or the other cities and large towns of the region to formulate an answer. But what does it imply for the Orang Asli, for the Meo, the Montagnards, for the remote hill tribes of Northern Luzon and West Irian? Conversely, to what extent can and should the existence within a country of these groups with very distinctive cultural and social backgrounds modify not only the strategy, but also the extent of curriculum reform?

The dangers of transferring new science programmes from one country to another are constantly being brought to our attention. Avoid the educational misfits! Do not adopt, adapt! Do not adapt, create anew! No one seems to question whether the methods and strategies of curriculum reform are transferable with equal facility from western countries to the countries of this region. Quite apart from the obvious cultural differences, the problems of the dissimilar ethnic groups within a country and of communication with remote areas are unfamiliar in the West.

The main political driving force in education is the desire to strengthen national unity by emphasizing such concepts as the monarchy, the state or by propagating a national language. It is also true, of course, that the educational system could be used to attain purely political ends. That this is so rarely done reflects the traditional integrity of both teachers and administrators. It must, however, be realised that meeting the needs of national unity will impose some restrictions—particularly where the provinces of national language and science overlap. I am specially interested to know if and how the medium of instruction modifies the effectiveness of teaching science by a particular method. To my mind this is a much more important question than either the administrative problems of printing or translating texts or the academic problem of creating the necessary scientific vocabulary. All of which have been tackled here in the region with determination and success. The other retarding forces in the political sphere are those such as defence, which link up with the economic factors—and so we have come full circle.

The educational sphere is perhaps the most complex and is itself inextricably intertwined with all three others. The driving forces for curriculum reform here are: the explosion of knowledge, the increasing student population, and the results of research in educational psychology, educational techniques and into methods of effective evaluation. Over two of these we have little or no control: the third, the research into human thought and learning processes should become a formidable ally, provided that we ask the pertinent questions. Two specific questions occur to me. First, how does the cultural and social background affect the learning processes of children in the South East Asian region—particularly in regard to scientific topics. Second, what evidence is there to support the effectiveness of the investigatory approach to the teaching of science. These questions are not precisely formulated, but I think that you will see what is implied.

The repressive forces in education are depressingly strong. First, there is that in-built conservatism that seems to be the birthright of all teachers. "The results achieved by the present method are satisfactory, so why change it, especially when we cannot be sure that the new method is better?" It is not impossible to overcome this attitude, only tiresome. But there lies behind it a more serious problem, that of security for the teacher. At present a teacher is too often judged by the examination results that he achieves, and so in turn is the headmaster and his school with him. Percentage passes—these are the facts that count. You will read in the newspapers that such-and-such a school achieve an eighty percent pass rate and another only 60%. Inevitably the question is asked, why? The answer usually given: "better school". Better school for what? Why, passing examinations, of course. Any change in the curriculum that might undermine this stable situation will be vigorously opposed by pupils, teachers, parents and potential employers.

This enevitably leads us on to those formidable linked defences against change: the number, qualification and attitude of the teachers, the facilities available within schools, the textbooks, and the examinations. The order and manner in which each or all of these is attacked demands a strategy that will be peculiar to each country. But not all of these factors will be easily susceptible to the forces for change. In any country really talented teachers are few, and even the enthusiastic teacher may be in the minority. We must ask, "how well-qualified are teachers to implement a new curriculum and to what extent can they be trained?" "Is the overall standard of ability and interest consistent with the sophistication of the proposed course?" Sometimes we forget that implementing a new science programme in the region, not only requires that the teacher sets aside his safe, traditional methods and take up a method of teaching that requires skill and imagination out of the ordinary, but also that this method might be alien to his whole cultural background as well.

Perhaps most significant is a realistic assessment of the infra-structure. How often will a child have access to a laboratory, and what equipment will be available to him there? How frequently will a teacher be able to demonstrate a principle and how many children will he have in his class at the time? It is here that we may be in danger of asking the wrong question. I wonder if it is not a question of "How may Nuffield, or PSSC or ESS or whatever be adapted to our needs?", but rather, "How best may we teach science—or indeed mathematics—to classes of between forty-five and seventy pupils: classes that in all probability will have no access to a laboratory?" If ever a question needed an answer, it is this one.

Somehow experimental work must be stimulated and the teacher given an opportunity to interact with his class. It may be that programmed learning can provide us with some part of the answer. Perhaps too, another part of the answer lies in considering the effectiveness of mobile units, such as have been used in the southern Italian island province of Sicily.

Here again, I think that we are in danger of further error. It has always seemed to me that the secondary, and particularly the upper secondary science, has dominated our thinking, and since its problems are commensurately greater, the difficulty of our task has become exaggerated. Elementary science and mathematics have the great advantage that they require no laboratories and only simple equipment. If you need further evidence of this, come to see the current courses in Elementary Science and Mathematics at RECSAM. I have seen nothing that could not have been done in the classroom or in the open air—that best of all laboratories for primary science. There is no piece of apparatus or teaching aid that could not have been made with materials and equipment readily available almost anywhere—hammer, nails, scissors, saw, paper, card and wood. Certainly the difficulties of the overall ability and the training and retraining of teachers remains, but they are not insuperable as some imaginative schemes within the region have indicated. Maybe here is fruitful ground on which to begin our labours.

But how soon should we begin? Let us return to those generals, whom we left loitering over their plans of action. I think that we should dismiss the delayer immediately, even if his is a position of strength. The problems of education are too pressing in the region and throughout the world, and education itself too vital, to allow for any inactivity—even the calculated inactivity of the shrewd observer.

The choice is narrowing. You may be inclined to favour a line of cautious preparation, for the problems are many and complex and the price of failure high. But where will such a choice lead us? The difficulties are twofold : those embodied in the planning itself and, paradoxically, those that result from the planning. First, because of the complexity of the problem, the planning will be long and detailed. Can we afford the time? The very thoroughness of the preparations may itself have a depressing and retarding effect. If the time were available for such extensive planning, then it is still doubtful whether in terms of economics or manpower it is a realistic proposition to undertake planning of such detail. Second, can long term planning take into account the uncertainties in the results of educational trends that result from current research? For instance, I think that it is fair to say that in the United Kingdom there is a retreat from the extreme position of the discovery approach that was taken up some years ago. In terms of the position overall in the schools the mean is somewhere almost exactly between the traditional and the extreme discovery approach. The modern scientist knows more than Archimedes, but he has not arrived at his present situation by the most direct route, but by a zig-zag path, which has often turned back on itself. At no one time is the scientist in a suitable position to ascertain the correctness of his course. Why should the educationalist be in any better position to do so?

As for the problems which arise as a direct result of the planning, I will take just two. Specific essentials for the success of a science education improvement programme have been cited as being, (i) that the educational methods must be radically innovative, (ii) that there must be an appropriate minimum critical mass of resources to support the whole effort for no less than ten years. Can we afford to wait until these two criteria have been achieved?

I have a fear that it would be too easy to emulate those administrators who are always absorbed in building a background through study, research and discussion who never put any ideas into practice. They are like the man who took a two mile run to get up enough momentum for jumping a fence. When he reached the fence he was far too exhausted to jump. You will see that my predeliction is for that general who is prepared to act with reasonable swiftness and with reasonable chance of success utilizing such resources as exist and such relevant information as he can gather in the available time.

Others have acted swiftly before. I should like to quote you the case of the Scots—a nation notorious for their caution and, indeed, their economy. "New syllabuses in physics and chemistry were introduced in Scotland in 1962 after a very short period of trial in a few schools in the previous year........... It may have been thought very foolhardy to introduce new schemes to schools without adequate testing, it was felt, however, that the need for revision was so urgent that the offer of new syllabuses to the schools could not be postponed until they had been perfected........... Scotland became one large pilot area, as many schools as wished joining in."

My plea, then, is for speed and simplicity in implementing reforms. If you will guarantee that in five years' or even ten years' time classes will be of no more than forty, that all secondary schools will have at least one adequately equipped laboratory, that there will be radical changes in the attitude to examinations, that there will be manpower and instruments for effective evaluation, well-equipped research centres and facilities training for teachers, then I concede that the range and the depth of our discussions are justified and relevant. If not, then we are talking of the wrong things and asking the wrong questions, and we should begin to think more realistically in the shortest term.

Should it be action or reaction?

A SECOND LOOK AT TEACHER EDUCATION AND SCHOOL CURRICULUM REFORMS

by

Mr. Chin Pin Seng,
Director, RECSAM.

The movement in school curricula reforms in Southeast Asia which was started in the last few years of the sixties is gaining momentum. This is especially true of science and mathematics at all levels of school education. It is important to note that it is the general declared policy of governments in this region to give the highest priority to improving the quality of education particularly in science and mathematics disciplines through the use of modern learning techniques that can meet the changing needs of to-day's children.

UNESCO and other international agencies including the SEAMEO Regional Centre for Education in Science and Mathematics (RECSAM) in cooperation with the respective governments have played and are playing a significant role in assisting them to make a breakthrough in the reform of mathematics and science education.

Countries have tried or are using various approaches to the problem of organising their resources for educational development. Some have adopted ad hoc measures while others examined their educational structures and made many drastic changes. On the whole a systematic approach has been developed by various Ministries of Education to meet the new challenges to education. Educational planning and research units have been set up, in-service courses for teachers conducted, science education centres established and pilot schools used for trying out newly developed teaching materials.

There has been increasing awareness that teacher education has not been wholly involved with this reform movement. It is difficult to comprehend the time lag because it is accepted that the teacher occupies the central role in any educational development. Unless his education and training are orientated to meet new teaching situations adopted in schools he will be a misfit. He has to join the ranks of thousands of teachers that will be called up for in-service courses. Unless this situation is remedied such types of in-service courses will go on forever.

Teacher education development has not caught up with the pace of school curriculum development. Statistical projections of the supply and demand of teachers for most countries in this region for this decade to cope with the quantitative expansion of schools indicate that the situation will be satisfactory except for the supply of teachers in science, mathematics and technical/vocational education. This quantitative expansion is being done at the expense of quality.

There are numerous underlying causes and some of the main factors can be outlined in this paper. Perhaps we are too ambitious in teacher preparation programmes especially in developing countries. We want our teachers to acquire a thorough understanding of the child, his development and needs and a sound knowledge of their national ideology and the diverse needs of their society in a scientific age. We want them to obtain a good background of the philosophical, psychological, historical and sociological principles of education. In fact, we require them to know thoroughly all aspects of the educative process, the theory and practice of teaching. They should acquire a sound knowledge of the 'content' of school subjects needed for his career and develop a wide variety of teaching skills so as to participate in classroom and co-curricula activities.

In addition, our prospective teachers are trained for active participation in youth work, community programmes and development both in urban and rural areas, adult literary programmes and social work. The curriculum consequently becomes unduly overloaded, fragmentary and unco-ordinated. But we still expect them to acquire such desirable outcomes within a short span of two or three years in a training college in the context of knowledge doubling itself every ten years. We also expect university graduates to acquire such desirable outcomes after a year's course in education. It has been recommended that since a longer period of training is required, an additional year or two should be added to spread the load in teacher education. On the other hand, we should be realistic enough in our goals and objectives. We should concentrate on the specific job of training teachers to teach effectively what is expected of them in the fast changing world of to-day in order to make learning relevant to children and to prepare them to face the challenges of tomorrow.

Teaching itself is a full-time and complex job. No other profession demands the application of such a variety of methods, techniques, knowledge and resourcefulness as teaching does in a developing country. Let us then confine ourselves within the existing prescribed period of pre-service training to educate trainees to do his teaching job well and forget other objectives some of which have been outlined above. If we want them to be effective change agents in schools we should not dilute their training with the possible consequence that they are neither here nor there in the final analysis.

By and large teacher education institutions in this region tend to spend too much time on theories as they have to complete the requirements of their syllabi so much so that very little time can be spared for activities that will provide trainees with the necessary personal experiences, apart from the traditional teaching practices. Theory is important but a lot of it can be done away with without affecting the effectiveness of training. Much of such valuable time can be devoted to provide trainees with real life situations and problems in teaching within and outside their institutions. The oft-quoted philosophy of 'I hear and I forget and I do and I understand' applies equally well to both schools and teacher education institutions. Unless effective moves are taken to educate teachers for curriculum changes in schools the school curriculum reform movement will face serious setbacks.

Country reports indicate that generally teacher colleges tend to become routine in their work. Not much of contributions to new advances in the science of teaching have come from that section nor have they responded much realistically and enthusiastically to the latest developments in school curriculum reforms. This calls for a thorough review of the teacher education system with the objective of speeding up curriculum development in teacher education in order that it can at least be kept in phase with the pace of school curriculum reform movement in their own countries. In principle, teacher education development both for quantity and quality should precede school education reforms.

Let us examine some of the possible strategies, both short and long term, that need to be taken by national authorities, teacher education institutions and related organisations so as to close the gap between teacher education and schools.

The scale of work that is anticipated in teacher curriculum reform in a country in Southeast Asia is very much smaller than that in school curricula reforms because the number of teacher educators in a country is in the order of hundreds while the number of teachers is in the order of thousands. The number of teacher colleges and faculties of education is in the order of tens while the number of schools is in the order of thousands. This means that the quantity in teacher training institutions involved is more conducive to a speedier pace in curriculum development.

Ministries of Education in developing countries usually have the following basic divisions to direct operations at national level, namely (i) teacher education, (ii) schools (primary and secondary), (iii) higher education and (iv) education planning and research. There is a strong need for the formation of a high-powered national action council to integrate curriculum reforms in schools with teacher education. Short and long term plans are expected to be formulated by the four major divisions of the ministry concerned with the co-operation and assistance of universities and other national organisations and experts. The co-ordination of efforts in implementing plans over a fixed period of time by these divisions is always a very difficult task and it should be handled by representatives from these divisions. However, the proposed national action council should have powers to check on organisations and institutions concerned in order to see how effective the implementation of formulated plans has been carried out. It should also have powers to recommend to their Ministers of Education the necessary action to be taken on problems that both colleges of education face in carrying out curriculum reforms.

The national curriculum research and development centre should have a unit devoted to curriculum reforms for teacher education that should be parallel to those for schools. It is vital for such a unit to be placed under the supervision of this centre. It will ensure better co-ordination and integration of reform plans with those to be carried out by school curriculum workers. The unit should be staffed by outstanding teacher educators in curriculum development in order to spearhead the reform movement in teacher education. Teacher educators might be more reluctant to accept curricula changes and new methodology than school teachers.

The unit should serve as a nerve centre and plan co-ordinated action to be taken by selected teacher colleges and faculties of education in pilot projects, experimentation and testing of new approaches, strategies, methods in and instructional materials for teacher education in co-operation with pilot schools in their vicinity, where applicable. If teacher colleges are not ready for such involvement, then at least a secondary and an elementary teacher institution be selected as 'colleges of excellence' for this task. They should be properly equipped with outstanding staff trained to lead in curriculum reforms and with resource materials to experiment with new ideas and develop suitable materials, methods and techniques for teacher education that will not make teacher preparation obsolete and irrelevant to the present and future needs of schools. University scholars and teacher leaders, community leaders and specialists in other institutions should be invited to serve on various committees and task forces of these 'colleges of excellence'.

Surveys conducted by countries in this region have shown that there is an acute shortage of key personnel such as teacher educators, teacher leaders, curriculum designers, researchers, administrators, organisers, supervisors of schools, and examiners that have been trained for various leadership roles in various areas of curriculum reforms. The main reason is that the reform movement began to take shape in the mid-sixties. Realising the key role that education plays in the development of nations and 'the forces and the challenge of change in the contemporary world' brought about by science and technology, which can benefit them, eight countries in Southeast Asia pooled their limited resources together to form the Southeast Asian Ministers of Education Organisation for regional educational development through joint cooperative action.

One of the needs is to solve the critical leadership problem by establishing regional centres in countries of this region. The Regional Centre for Education in Science and Mathematics (RECSAM), located in Penang, Malaysia and the Regional Centre for Educational Innovations and Technology (INNOTECH), to be located in Saigon, Vietnam by June 1972, are projects for the training of key personnel in the use of modern approaches and innovations and educational technology and applications of principles and techniques relevant to the modern educational needs of member countries.

RECSAM has founded curriculum development plans for five years up to 1975 to train a total of 1150 key personnel for the region in training and research for leadership roles in school curriculum reforms in mathematics and science. So far 360 key educators have received such training. However, courses which are of three months duration are constantly subject to review and evaluation and new courses will be added or will replace those that have served their purposes. There is an urgent need for special courses for key teacher educators on curriculum development in colleges of education and RECSAM will plan and provide such courses next year in order to strengthen the infrastructure of teacher preparation in member countries. The retraining of teacher educators should receive as much priority as school teachers.

The large numbers of teachers for pre-service and in-service training in curriculum reforms annually, calls for the use of new methods and techniques now available, owing to the shortage of key teacher educators and teacher leaders available to conduct these courses. Universities and very large schools in developed countries have shown that the cost-benefit ratio justify the investment in educational technology such as closed circuit television/micro-teaching, programmed instruction, language laboratories and other self-instruction devices, correspondence courses, radio and educational television lessons. These new methods and techniques should be adapted for use in the training of teachers as they can make a breakthrough in improving the quality of teacher education.

While it is desirable to set up comprehensive colleges of education to cater for training in all subject discipline areas all over the country, the short supply of teacher educators in various disciplines may be the bottleneck for full implementation of such plans. For example, it may be difficult to duplicate the training of science and mathematics teachers for all colleges because of inadequate teacher educators in these disciplines. Experience has shown that in a developing country where several colleges need to be set up to cater for more and more pre-service training, it is more efficient for the country to set up colleges for training in related academic areas. For example, in Malaysia, at the secondary level, there is a college for the training of science and mathematics teachers, one for technical and vocational teachers, one for social studies, languages and arts & crafts including home science and physical education and another one for agricultural science and mathematics. This type of teacher education system may make it easier to implement curriculum reforms in teacher education than the traditional system.

An important problem that needs to be looked into is the policy of training general purpose teachers for primary schools. It may be necessary for a primary teacher to be prepared for general purpose teaching. However, in certain subject areas like language teaching, art and crafts, science and mathematics nowadays, it is difficult to expect the teacher to be equally good in teaching these areas. Should training provide for options in these areas? New approaches and innovations in teaching primary children are taking place rapidly around us. If teaching is to be effective and relevant today, the traditional teacher education system needs to be adapted to changing situations as soon as possible.

In many countries in this region an average of fifteen to eighteen hours of lectures a week per lecturer is usually required by an institution. Most teacher educators reckon that this is all the work expected of them. In actual fact, they are expected to get involved in education research programmes in their special areas but this was not the pratice in the past. It seems essential that national authorities should remedy this defect. Curriculum research and development programmes should be instituted in every college of education. A college without such programmes is like a garden without flowers and will become sterile.

It is recognised that regular in-service courses for teachers are necessary to modernise and improve the quality of teaching. This applies equally to teacher educators because they need refresher courses as much as school teachers in order to be responsible to the ever-changing needs of society.

Seminars and workshops have an important role to play in curriculum development work and should be held periodically from international level down to district level and should involve both key personnel from teacher education and schools. Follow-up action is very necessary if these are to be of any value. It is to be noted that many participants are sceptical about attending these sessions and their grouse is that they do not even get reports of these meetings from the organisers.

In the context of Southeast Asia, it is difficult to expect any tangible results in curriculum reforms from local district or even provincial curriculum workers. Because of the existing structure in the education systems national authorities have to take the initiative and teacher educators and teachers alike look up to them for the green light.

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DOES THE SYSTEMS APPROACH REALLY WORK IN CURRICULUM DEVELOPMENT?

by

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The answer to this question at the moment is Yes, No and Don't know.

Any attempt to answer this thought-provoking question should begin by defining the kind of curricula development that one intends to go into one can only assume that since RECSAM is a Science and Mathematics center and that this august assembly have come together to discuss about " modern curricula in Science and Mathematics at elementary and secondary levels, the next step, then, is to establish whether or not there are any problems that have arisen in the curricula development in the above mentioned areas. As such the answer that one would get to the above question would be different : depending on the objectives and criteria establish by the country where the curricula is being developed for.

Before going into the discussion proper, let us recapitulate on what the systems approach is and what one can expect, and by the same token not expect to do. The main properties of the systems approach is that it is a loop of systematic steps and questions whereby a decision-maker can use as a guide to develop his thoughts and ideas logically so that he can visualise the situation and come to a decision that is not only comprehensive and effective, but that it will also be the basis for which he could re-evaluate and re-construct it to fit the change in time, place and circumstance.

By examining the problem and its situation a decision-maker can then identify the problem at hand and its magnitude. Once the problem is identified, the setting of objectives, criteria, and the study of alternatives would allow the decision-maker to plan his action. The next step then is to prepare the plan for implementation. Nothing is left to chance. Instructions that form the output are tested and exact. Every opportunity is given to the implementor to achieve his goals. There is absolute rapport between the planner and the implementor as the system is controlled through reports for further evaluation, modification and ratification if required.

It has always been wrongly assumed that the use of the systems approach would require the entire demolishing of the old and the starting of a completely new beginning of things. This misconception has alieniated the traditionalist and have caused him to throw up his defences and to question " What is wrong with what we are doing? Are we not getting the results? " In actual fact the systems approach is a most versatile tool to examine the effectiveness or the ineffectiveness of existing practices and to point out as to whether such practices are the appropriate ones to use under the existing circumstances and times, whether it needs parted changes and modifications, a complete over-haul, or even to indicate the need to replace it with something new.

Another misconception is that the systems approach is a panacea for all academic illnesses. Far from it, the success in the use of the systems approach for decision-making or problem-solving depends very much on the calibre and quality of the decision-maker. Its usefulness as an administrative tool will depend on how it is used. Any failure to obtain the desired effect from it must need to establish the competence of the user of the tool.

In fact systems analysis is more of a method of investigation rather than a scientific procedure for reaching decisions. As such the need for intuitive elements is essential and analysis is a mechanism for sharpening the intuition of the decision-maker.

With the above idea of systems analysis clear in mind the first step is to establish whether there are any problems in curricula development in general and in the teaching of Science and Mathematics in particular. Man is seeing his environment changing daily. Where previously nature controlled man's actions and destiny, today man is able to understand his environment and in some way even to modify and control some of the elements to suit his purpose. This has been possible through the advancements made in Science and Technology. As such since the general rationale of education is to train and equip our children for adult life would not there then be the need to re-evaluate the existing aims and objectives in education in general, and the teaching of science and mathematics in particular. Basic problems can then be examined so that any action to be taken on the main system would not be clouded by apparent pressing problems from the periphery such as schools, teachers, finance, etc., which can be off-set as sub-systems. Paul E. Blackwood speaks of " renewed attention to developing a clear rationale for Science teaching " and the need to " reassess the rationale back of the Science curriculum " due to the rationale having " changed somewhat from time to time, and to some extent these earlier purposes and methods become unrecognisably diffuse or were lost in the materials available in recent years. Robert B. Davis also speaks of the need to " combine mathematics and science, or at least to relate the two." The " ever-increasing tendency to unify mathematics and to cast aside any division into component parts such as arithmetic, synthetic geometry, analytic geometry, algebra, physical application etc. The " introduction of matrix algebra at various grade levels " in the secondary school. The " greater diversity of kinds of learning experiences, especially the inclusion of physical experiments as part of the study of mathematics.

It is with these needs in mind that the age-old question of whether the teaching of school-level science and mathematics should be child-orientated or whether they should be content-orientated; be analysed and have recommendations made. Any research into these areas should emerge from and contribute to the extension of sound educational theory. " Basing research only on past efforts within the field of science education will continue present entrenchments and foster efforts on insignificant and peripheral problems. Related fields in the behavioural science contributed not only basic theory but also refined techniques to research in science teaching," state Johnson, Cobourn and Blackwood.

Teachers of Science and Mathematics have tried to establish the objectives and have been asking themselves the following questions :

1. What are the factors that determine the place and function of science education in areas that are highly dependent on science and technology?
2. What should be the place of science courses in relation to other courses of study in a school curriculum?
3. How should the purposes of general education and specialised education in science influence the selection and organisation of content and the teaching method at the different school levels?
4. What science concepts, principles, skills, attitudes and appreciations should be acquired by all pupils?
5. What are relative merits of the various approaches such as basic science, applied science, and solving community and personal problems, in achieving the accepted objectives of science instruction? and
6. To what extent should process outcomes of science education such as modes of scientific thinking attitudes, interests and appreciations be made an integral part of teaching and learning of science.

From the above trend of questions a systems analyst can infer than the decision-maker is trying to fathom the location of the learning and instruction of science in (a) the universe, (b) the nation, (c) the community, (d) the school, (e) the curricula and (f) the individual. He is pondering on the emphasis that should be given to it : the balance, relationship, place and the quantity that should be attributed to it. In short he wants a format, a framework where this apparent amorphous commodity can be systematically laid out so that it can be studied in its proper perspective. This is where the systems approach would become a valuable instrument to allow for such a study, analysis and proper decision made. The system would allow for the implementation of tested, refined and programmed instruction. With its in-built reporting system, evaluation and modification can be made when the implementors are clear as to the areas for improvement, determine its effectiveness, be aware of the implications of the basic principles of learning and to compare the performances of the various children. Maurice Belangor in the Review of Educational Research of the A.E.R.A. concludes the trend in the use of systems approach very clearly when he states that " many workers in educational research have been participating in the development of conceptual models and in the formulation of theories of the teaching-learning process; this trend holds great promise for future research in mathematics and science education." So, although there are some quarters that claim that the product of such research as seen in programmed instruction have not indicated any superiority over the products trained through traditional methods, yet, it can be pointed out that the use of the systems approach in educational research have been recent, and that if the results can measure up to the very best produced through traditional methods, then when given time, the results that can be expected from a system that is constantly evaluating and modifying; will become even better, especially when the evaluation encompasses even the basic principles as well as the changes that occur from time to time.

In conclusion I would say that whether the systems approach, or any other method of research for that matter, really works in curricula development or not will depend on many aspects. Some of these aspects being: (1) How, (2) When, (3) Why, (4) By Whom, (5) Where it is used. It would not be successful if it were used by one who expects to find an answer to his problem by using it on its own. But when used by one who is well versed in using it as a method of study, coupled with his deep insight into the needs and problems of the topic area, systems analysis will then be a first-class research tool in his study. System analysis as indicated in the systems approach would make him aware of the variable effects of time, place and circumstance so that these variations can be catered for when an effective decision is to be made.

In Malaysia the systems approach is most evident in the implementation of programmes. We hear more and more about pilot projects and the control of projects through reports which are evaluated and then modified. With the increase in personnel exposed and trained in the systems approach we see its increased use in the planning establishments such as the Economic Planning Unit and the Development Administration Unit of the Prime Minister's Department and also in the Education Planning and Research Department of the Ministry of Education.

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A NEW LOOK ON EDUCATIONAL OBJECTIVES IN SOUTH EAST ASIA

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During the 70's the relationship between work, education, and employment will continue to undergo significant changes. It can be anticipated that the impact of these changes in this relationship will effect likewise far-reaching developments in educational institutions, government policies, and in the pervading social structure. The greater importance attached to education as a dimension in all the national goals, the rising level of educational attainment and the pursuit of a basic education prerequisite to a successful vocational adjustment, a richer personal life and effective community membership has generated a perspective of re-examination of objectives prescribed by the policy makers.

This paper will, therefore, focus on (1) developments regarding the objectives of education and present (2) a methodological inquiry as it relates to national objectives of a case study country, the Philippines.

Contemporary literature* reports that every educational system has economic, political, social and religious objectives. Three universal educational objectives over time were identified as : (a) socialization, (b) recruitment, and (c) social placement. With the development of technology there was a corresponding pressure to produce high-level manpower without a corresponding insight into the content, intent and methods inherent in the educational system. A diagnose of crisis in the system as seen in the incidence of drop-outs and the indictment of irrelevance by student protest movements have encouraged efforts to democratize education and to think of education as an instrument in achieving certain goals. Such a reorientation may likewise be seen in :

1) the multi-disciplinary approach to the education of technocrats,

2) the "de-schooling" of people into social places through the examination system,

3) few and isolated curricular reforms.

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*Christopher M. Labani, **Ends and Objectives in Education,** UNESCO, International Commission on the Development of Education, Series B., Opinions : No. 7, 1971, pp. 1-8.

Objectives or redefinitions of such educational objectives are suggested for this decade—that of education for development, justice, and self-reliance.** From the Philippine experience, however, a redefinition of such objectives are in order. Corpus***, observed that the objectives are loaded with fine sentiments and are achievable only by the whole national society. A reformulation of such objectives which can be translated into performance targets and derived from a statement of national developmental goals is suggested.

The following generalizations maybe made regarding goals or objectives:

1) There is recognition of the fact that educational goals or objectives need to be stated explicitly in **observable, attainable** and **measurable** terms. Such terms as **knowing, understanding, developing,** etc., are open to **multiple interpretations.**

2) In the execution of these goals or objectives there is recognition of the need for planning consistent with the system of administration and government.

3) There is insistence that restatement of goals on the policy level should be in terms of the development needs of the country. In the process of goal reformulation, a new type of aspirational goal has emerged—the need for a society which defines what properly should be the fullness of the development of man.

4) Evaluation is objective-based and system analysis is finding increasing use as a quality control tool to make possible the consideration of educational goals and objectives at all levels and at various stages in the educational system.

Actualizing New Educational Objectives

Everyone in Southeast Asia needs to be aware that Educational goals or objectives are changing due to cultural needs and the unknown toward which we educate. Development of problem-solving attitudes, tolerance and ability to deal with what is unknown, flexibility and self-understanding will need to occur in a response—directed environment. Societies would have to resolve the choices between educating for society-directed objectives and the preservation of individually-chosen educational goals.

** Ibid., pp. 7-8.

*** O. D. Corpus, **Education and National Development,** Nov. 1970, pp. 9-10.

The objective of providing each one with all the education experience he wants, the " learning-work-growth model " is reasonable and would be economically more feasible if predicated upon self-education as a primary societal objective and utilizing media and non-professionals to improve efficiency. New needed educational objectives would lead toward :

1) the fostering of self-directed, self-appropriated learning;

2) assisting with the integration of direct and vicarious (i.e., TV) life experience.

3) the fostering of problem-oriented thinking, with some attention to the systematic nature of societal issues and forms and a need for an alternative-future emphasis.

4) the developing of skills necessary for using information technology and for acquiring self-appropriated knowledge base, and

5) the developing of a contributing relationship with the larger community.****

Review of Objectives Research Efforts in Asia

A recent analysis of the objectives of elementary education in 15 countries***** provided baseline comparisons of : (1) over-all objectives of education, (2) objectives of school education, (3) objectives of elementary education (4) objectives of secondary education and (5) problem or difficulties identified from the National Reports related to objectives. Also revealed were the status of national curriculum development efforts.

In addition, a country case study to be conducted in-depth on goals, aims and objectives was envisioned***** to provide methodological guidelines in the formulation and reformulation, implementation and evaluation of goals, aims, and objectives. The Philippine Case Study is thus being conducted in this context.

**** W. W. Harman and M. E. Rosenberg, **Methodology of educational futurology,** UNESCO, International Commission on the Development of Education, Series B : Opinions, No. 44, 1971, pp. 1-15.

***** A 3 volume study entitled Asian Study on Curriculum, NIER, Tokyo, Japan, 1970.

****** UNESCO-NIER Regional Program for Educational Research in Asia, 1969, 1970 and 1971.

The Philippine Case Study

National goals are expected to provide vigor to societies and show their dominance in political and social thought. The goal consciousness of a people may be gleaned from the concern with achievements in national and social objectives. The Philippines, is no exception to this goal consciousness.

The school within this context of goal consciousness is a mechanism for the fulfillment of individual and societal aspirations, for purposes of this study, it was assumed that it derives direction for its operational program from its social milieu. Its goals, curricular content, structure and program design strategies are feared towards these aspirations.

Since society's aspirations vary with the changing milieu, national goals could be expected to change although some are expected to persist for longer periods of time. Change is defined as constituting variation or modification in content, a shift in emphasis or a reinterpretation of an explicit goal. Changes in these national goals are associated with political, social or economic forces.

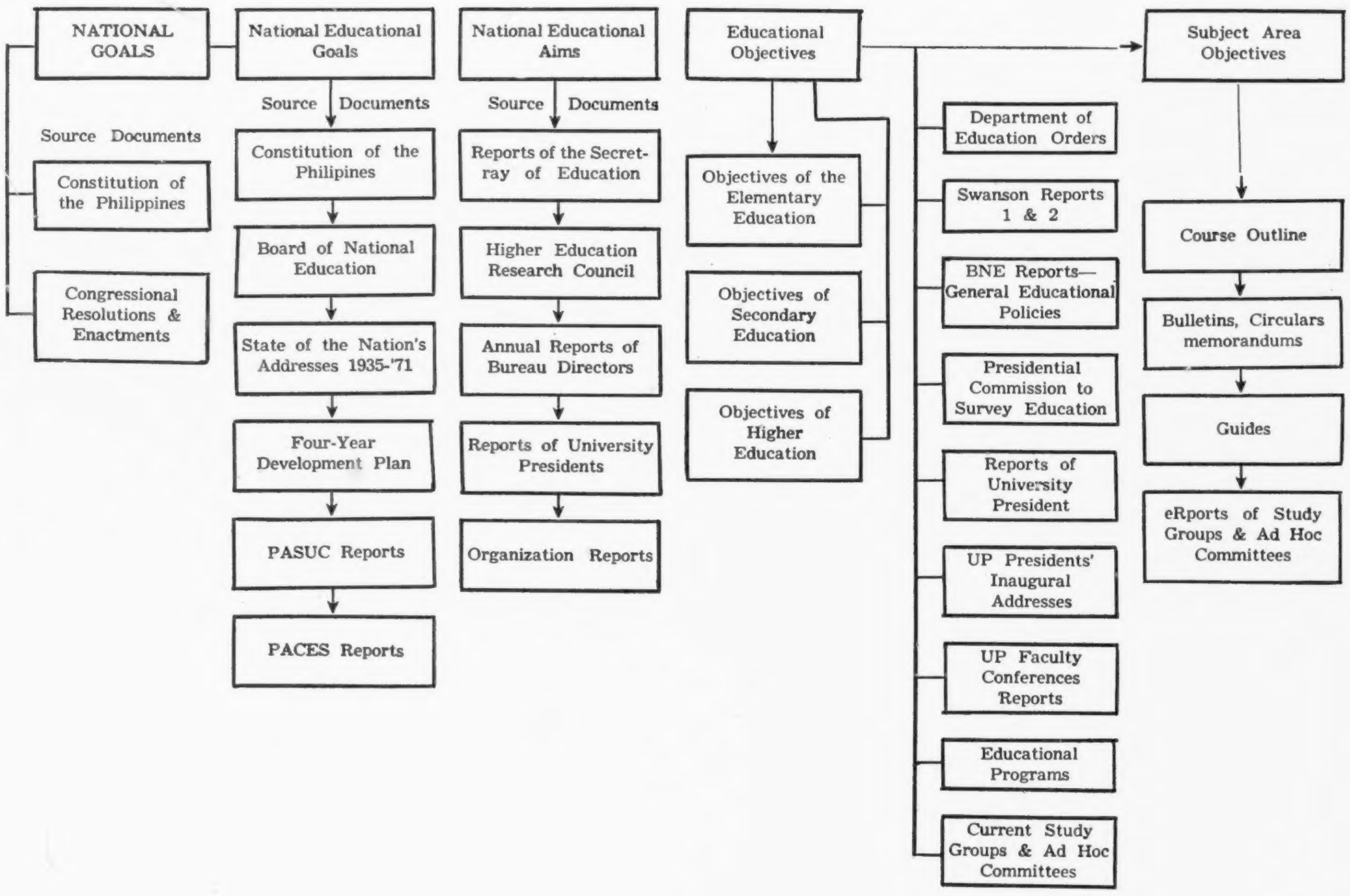
Content Analysis—The Methodological Approach

Goals, aims, and objectives were abstracted from the sources (See Chart I) designated for each. National goals were categorized in terms of the five-item taxonomy, namely: political stability, social development, economic development, human resource development and cultural development goals. See Definition of Terms, Appendix A. Table I shows the relationship as envisioned among national goals, national educational goals, educational aims, educational objectives, and subject-area objectives. Such relationships may be interpreted on the convergence-divergence continuum. Comparisons of each national educational goal, educational goal, educational aim, educational objective, and subject-area objective with each explicit national goal would determine their deriviation from their basis. Aims and objectives that did not seem to be derived or based on the explicit national goals were considered divergent. Those that did not seem to be derived from any explicit national goals were considered stray goals. Those that were derived from any explicit national goals were considered convergent.

To get at the whole spectrum of national goals for the time span (1935-1971) under study, available relevant source documents were reviewed. (Philippine Constitution, Commonwealth Act 586 (the Educational Act of 1940), Republic Act 896 (the Elementary Education Act of 1953), and the Magna Charta for Social Justice and Economic Freedom). Educational provisions in the constitution, the Board of National Education policies and pronouncement, the state-of-the-nation addresses of presidents, Development Plans, and Report of the Joint Congressional Committee were used as sources of national educational goals.

CHART I

GOALS, AIMS AND OBJECTIVES


NATIONAL GOALS
Source Documents
Constitution of the Philippines
Congressional Resolutions & Enactments
National Educational Goals
Source Documents
Constitution of the Philipines
Board of National Education
State of the Nation's Addresses 1935-'71
Four-Year Development Plan
PASUC Reports
PACES Reports
National Educational Aims
Source Documents
Reports of the Secret-ray of Education
Higher Education Research Council
Annual Reports of Bureau Directors
Reports of University Presidents
Organization Reports
Educational Objectives
Objectives of the Elementary Education
Objectives of Secondary Education
Objectives of Higher Education
Department of Education Orders
Swanson Reports 1 & 2
BNE Reports—General Educational Policies
Presidential Commission to Survey Education
Reports of University President
UP Presidents' Inaugural Addresses
UP Faculty Conferences Reports
Educational Programs
Current Study Groups & Ad Hoc Committees
Subject Area Objectives
Course Outline
Bulletins, Circulars memorandums
Guides
eRports of Study Groups & Ad Hoc Committees

Since the methodological approach is the focus of this paper today, the models for the hypotheses and work flow charts will be presented, including some tentative findings regarding the social studies curriculum:

1) Model for the study (2-loop model)
2) Model for Goal—Aim—Objective Delimitation which has a time frame
3) Model for Hypothesis 1
4) Work flow chart for Hypothesis 1
5) Model for Hypothesis 2
6) Work flow chart for Hypothesis 2
7) Model for Hypothesis 3
8) Work flow chart for Hypothesis 3
9) Work flow chart for Hypothesis 4
10) Table I — Content Analysis of National Objectives in Social Studies (1970)
11) Table II — Summary Distribution of Concepts derived from the Social Studies, Scope and Sequence, 1970 for the Three Levels
12) Content Analysis of sample periodical tests Fourth Yr. H. S.
13) Table III — Content Analysis of Philippine Government Findings 10th Yr. H. S., 1956 curriculum.

Findings and Interpretation

There is sufficient evidence to support acceptance of the hypothesis that Philippine educational goals, aims, and objectives are based on and derived from explicit national goals. Likewise, goals, aims, and objectives are based on and derived from implicit national goals. The evidence seems to indicate that there is congruence between educational goals, aims and objectives and the explicit national goals. Changes in the socio-economic-political milieu call, however, for a re-examination and reformulation of national goals and educational goals, aims, and objectives as bases for the restructuring education.

Since evidence the educational goal-setting process has used explicit national goals as basis it may be hypothesized that there is incongruence between the implementation of the programs as designed to achieve the goals or and the design of the programs.

Some findings, although not central to the hypotheses, are useful for their insights on program focus and definitions. One such finding is that the Philippine Constitution (1935) neither explicitly expresses nor implies a goal for the physical development of the individual. Republic Act 896 (1953) enacted 18 years after provided for the development of "healthy citizens". The lack of emphasis in school programs designed to attain the physical development if the individual earlier years may be attributed to the absence of an explicit national goal.

Analysis of educational aims revealed the absence of the explicit national goals for the development of world understanding and international brotherhood. However, two educational aims directed to word the achievement of world understanding and peace (Board of National Education), 1956; Congressional Resolution No. 8, 1948) were derived from an implicit national goal in the Constitution (See Table I, Social Development Goals, Aims ‡ 14 and 15).

Conclusion

Based on available documents, it can be concluded that aims and objectives, besides being derived from explicit national goals, are derived from implicit national goals. Stated differently, the genesis of educational goals, aims, and objectives are explicit and implicit national goals.

BIBLIOGRAPHY

Corpus, O.D., **Education and National Development,** Now, 1970, pp. 9-10.

Harman, W.W. and M.E. Rosenberg, **Methodology of Educational Futurology,** UNESCO, International Commission on the Development of Education, Series B : Opinions, No. 44, 1971, pp. 1-5.

Labani, Christopher M. **Ends and Objectives in Education,** UNESCO, International Commission on the Development of Education, Series B : Opinions, No. 7, 1971, pp. 1-8.

A 3-Volume study entitled Asian Study on Curriculum, NIER, Tokyo, Japan, 1970.

UNESCO-NIER Regional Program for Educational Research in Asia, 1969, 1970 and 1971.

APPENDIX A

DEFINITION OF TERMS

National Goals Explicit and Implicit. A national goal is a statement of a predominant aspiration of society—what it wants to achieve—identified by the body politic or any duly constituted authority. It is intended to provide overall direction to the national government and is usually expressed in broad comprehensive terms. It is more or less long-term in nature. It may either be definitely expressed or merely implied. If it is expressed, it is an explicit goal; if merely implied, an implicit goal.

National Education Goal. A national educational goal is a broad and comprehensive statement which provides global direction to the whole educational enterprise and which is more or less long-term in nature.*

National Educational Aim. A national educational aim is a statement at a level of specificity which provides direction to subsystems of educational system. They are formulated by key personnel in the educational enterprise such as the Secretary of Education, bureau directors and other school officials. National Educational aims were assumed to be explicitly expressed or implied in such documents as the Annual Reports of the Secretary of Education, Reports of the Higher Education Research Council, Annual Report of the Bureau of Director, College and University Presidents, and reports of professional organizations such as the Philippine Association of School Superintendents and the Philippine Association of General Education Superintendents.

Educational Objectives. An educational objective is usually a detailed statement which provides direction to a specific level of the educational enterprise. Educational objectives are embodied in such documents as Department of Education Orders, Survey Reports like the Swanson I and II Reports, Board of National Education policy statements, University Presidents' inaugural addresses, Bureau circulars, memorandums, etc., and reports of study groups and other ad hoc committee reports on education.

Subject-Area Objectives. A subject-area objective is a specific statement which provides direction for the design, planning, instruction, implementation, supervision, and evaluation of a definite subject area or course or program.

Subject-area objectives are formulated by supervisors, teachers, and curriculum writers. They are embodied in course outlines, guides, bulletins, circulars, and memorandums of each Bureau, and reports on the curriculum by study groups and ad hoc committees on subject areas.

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*Adapted from MEEAO-I Final Report.

APPENDIX A (cont'd)

Taxonomy of National Goals. The analysis of national goals began with categorizing them into five types, namely : (a) political stability, (b) social development (c) economic development, (d) human resource development and (e) cultural development goals.

Political Stability Goals. These goals emphasize intelligent participation in and relationships with the government; effective discharge of duties and responsibilities; internalization of the ideals which the State upholds; national integration and solidarity; civic and political rights; acceptance of political symbols; and obligation to combat forces that tend to divide the people and perpetuate their feeling of dependence and helplessness.

Social Development Goals. These emphasize attainment of general welfare; social justice and economic freedom; good home and community life characterized by economic security, peace and order, healthful living, home improvement and beautification; useful civic life; wholesome recreation; upright moral life; and socialization.

Economic Development Goals. These emphasize increase in total production; increase in individual earning and labor productivity; maximum employment; utilization, development, and conservation of natural resources; filling manpower requirements; vocational efficiency; development of habits of thrift and industry; respect for the dignity of labor; creation of greater job opportunities; industrial and agricultural development; self-sufficiency in the basic staples; cooperatives; and application of research, science, and technology in production.

Human Resource Development Goals. These emphasize manpower development; literacy; personal improvement and enrichment; development of useful, patriotic, enlightened, morally upright, self-disciplined, self-reliant, civic-minded citizens; development of wholesome personalities; physical, social, emotional, mental, and spiritual development; and attention to the handicapped, the retarded, and the gifted.

Cultural Development Goals. These emphasize appreciation, conservation, development, enrichment, perpetuation, transmission, and integration of the cultural heritage of the people; propagation of national ideals, the national language, national symbols, and desirable traits, traditions, custom, and folkways, and development and preservation of native art, music, and literature.

MODEL FOR GOAL - AIM - OBJECTIVE DELIMITATION

Past

NATIONAL GOAL

NATIONAL AIM

NATIONAL OBJECTIVE

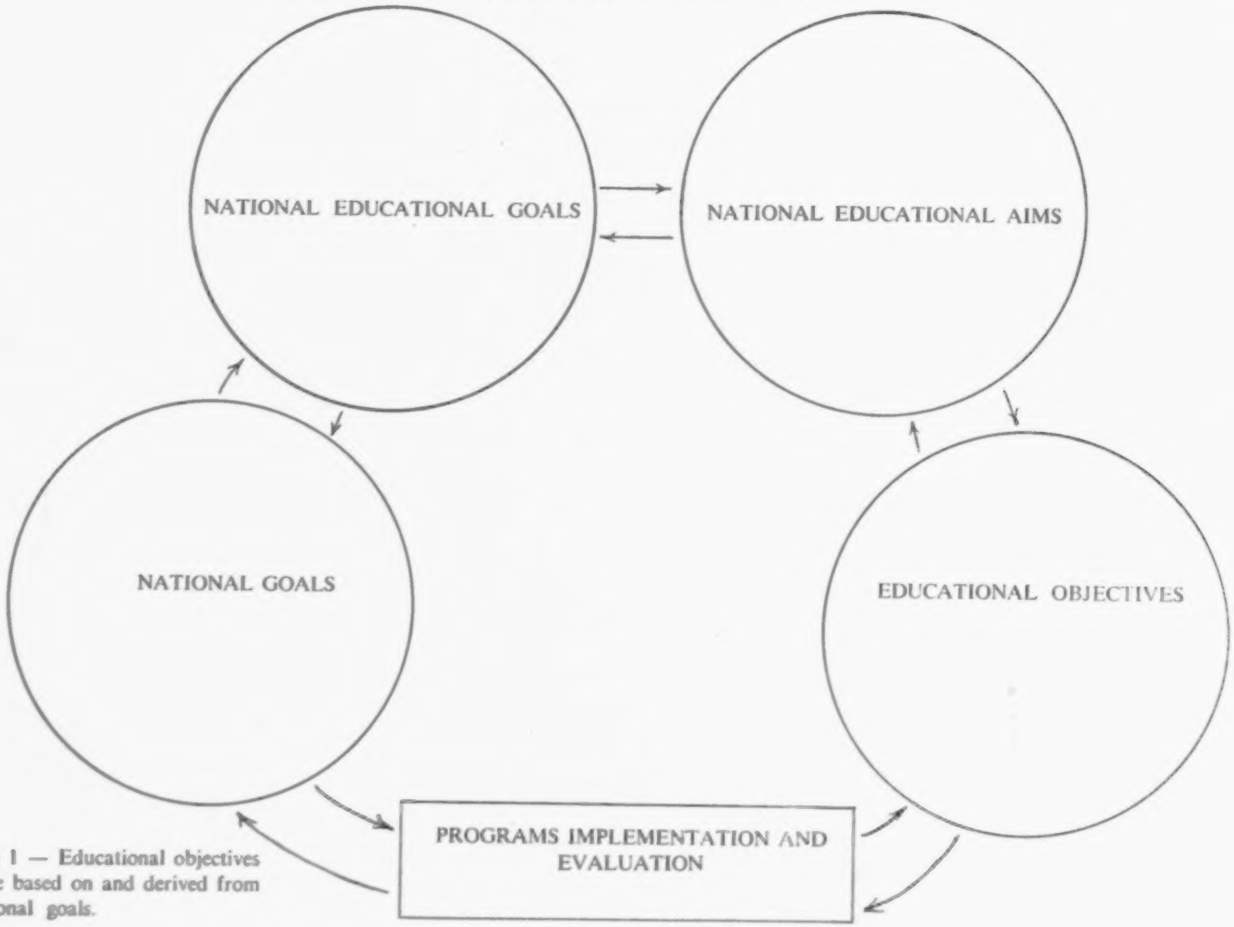
National Goal :
Broad and comprehensive statement; provides global direction to the whole educational enterprise; long term.

National Aim :
Statement at a level of specificity and detail which is intermediate between the limits indicated by the term " goals " and " objective ", reflective of changing periods in society.

Future

Educational Objective :
Specific, detailed statement; provides direction to the design, planning, execution, supervision and evaluation of teaching learning enterprise; transitory and shifting and reflective of national aims.

MODEL FOR HYPOTHESIS 1

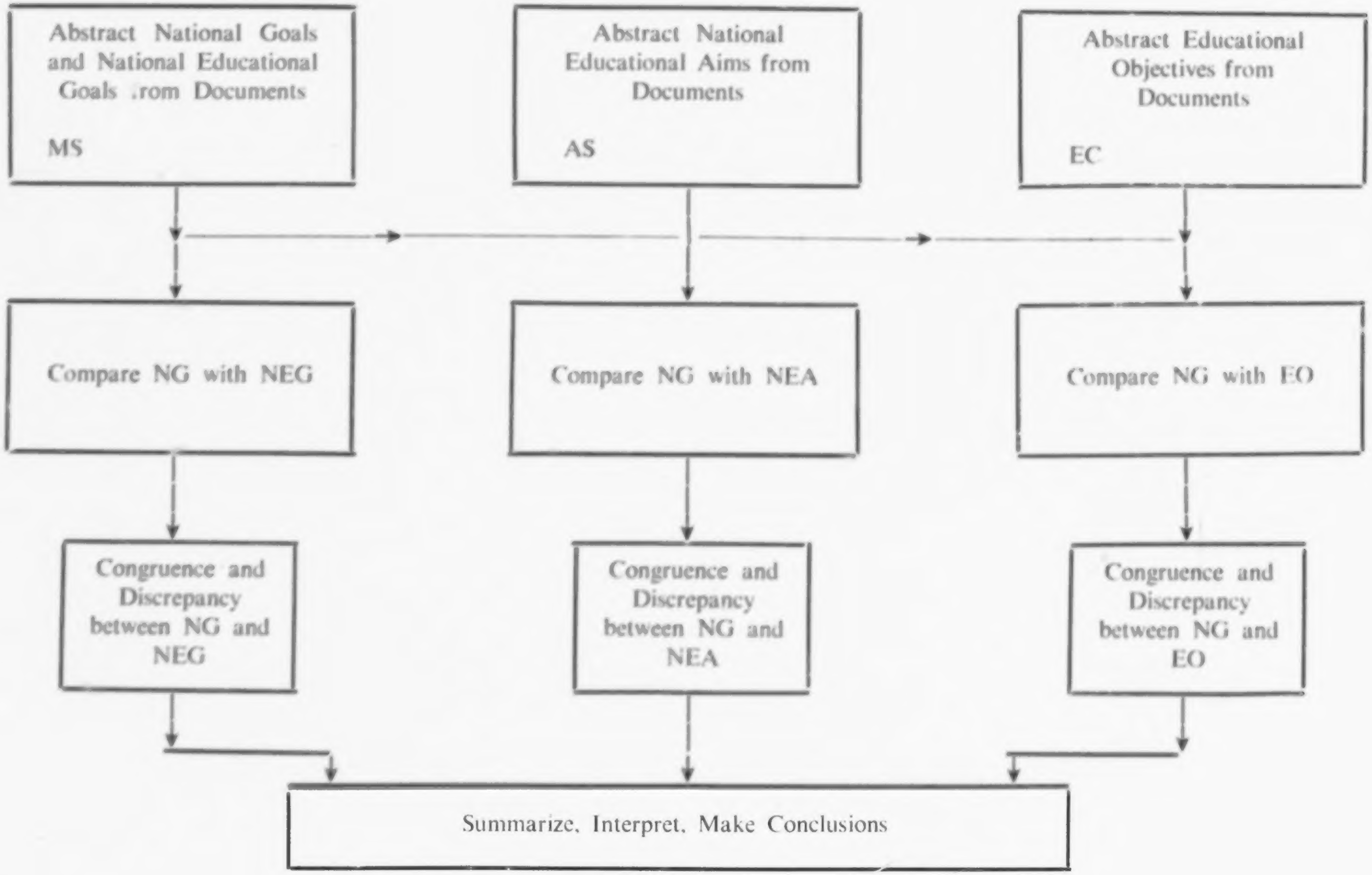

NATIONAL EDUCATIONAL GOALS
NATIONAL EDUCATIONAL AIMS
NATIONAL GOALS
EDUCATIONAL OBJECTIVES
PROGRAMS IMPLEMENTATION AND EVALUATION

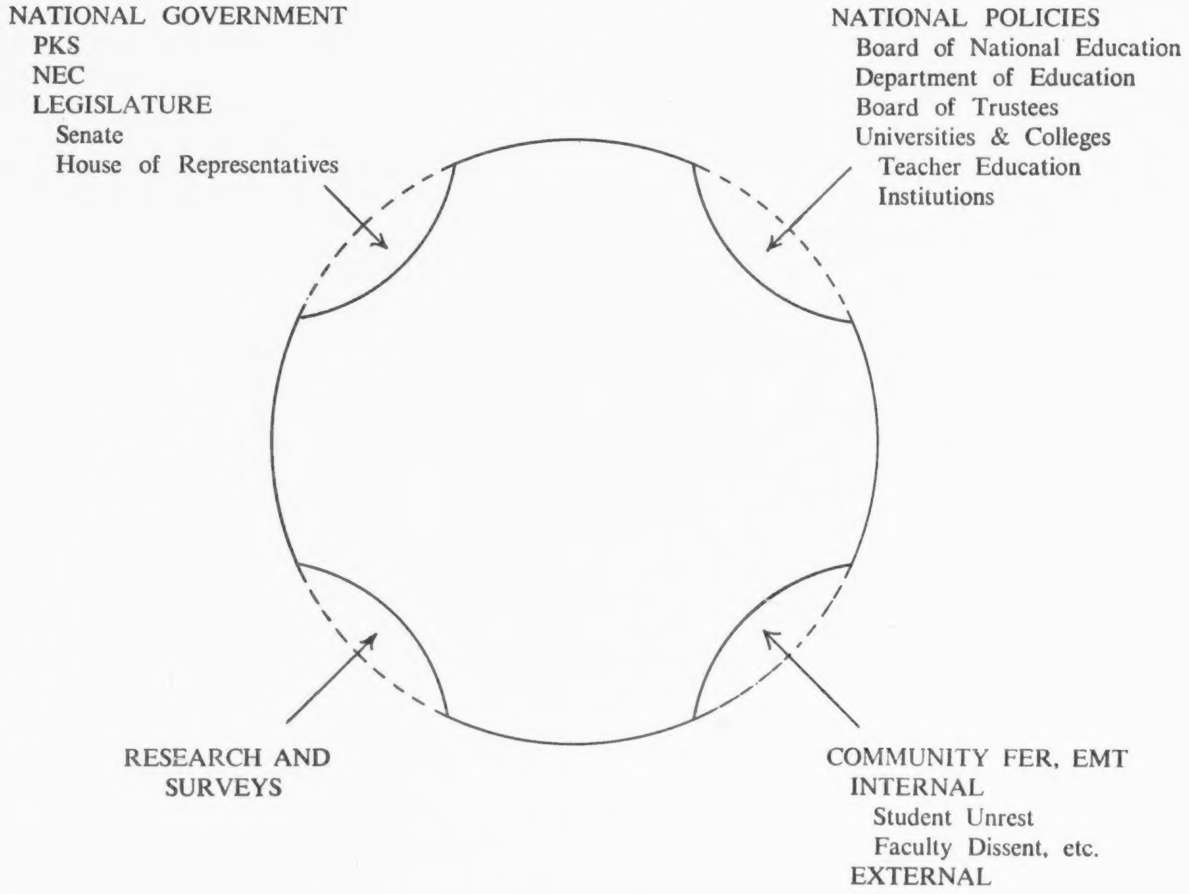
HYPOTHESIS 1 — Educational objectives and aims are based on and derived from explicit national goals.

WORK FLOW CHART FOR HYPOTHESIS I

Stage I (Hypothesis 1)

Hypothesis 1. Educational Objectives and aims are based on and derived from explicit national goals


Abstract National Goals and National Educational Goals from Documents
MS
Abstract National Educational Aims from Documents
AS
Abstract Educational Objectives from Documents
EC
Compare NG with NEG
Compare NG with NEA
Compare NG with EO
Congruence and Discrepancy between NG and NEG
Congruence and Discrepancy between NG and NEA
Congruence and Discrepancy between NG and EO
Summarize, Interpret, Make Conclusions

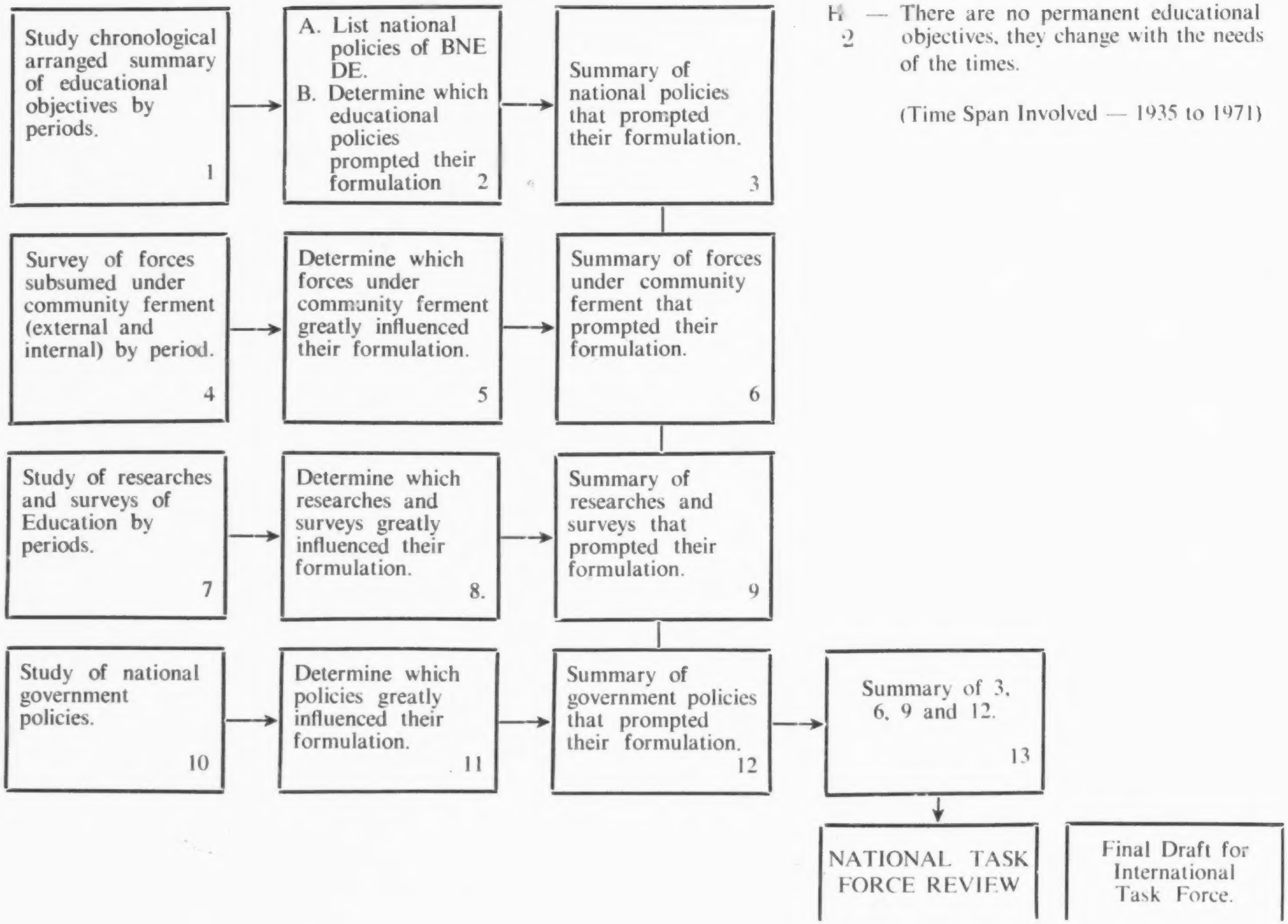

NATIONAL GOVERNMENT
PKS
NEC
LEGISLATURE
Senate
House of Representatives
NATIONAL POLICIES
Board of National Education
Department of Education
Board of Trustees
Universities & Colleges
Teacher Education
Institutions
RESEARCH AND
SURVEYS
COMMUNITY FER, EMT
INTERNAL
Student Unrest
Faculty Dissent, etc.
EXTERNAL

H_2 — There are no permanent educational objectives, they change with the needs of the times.

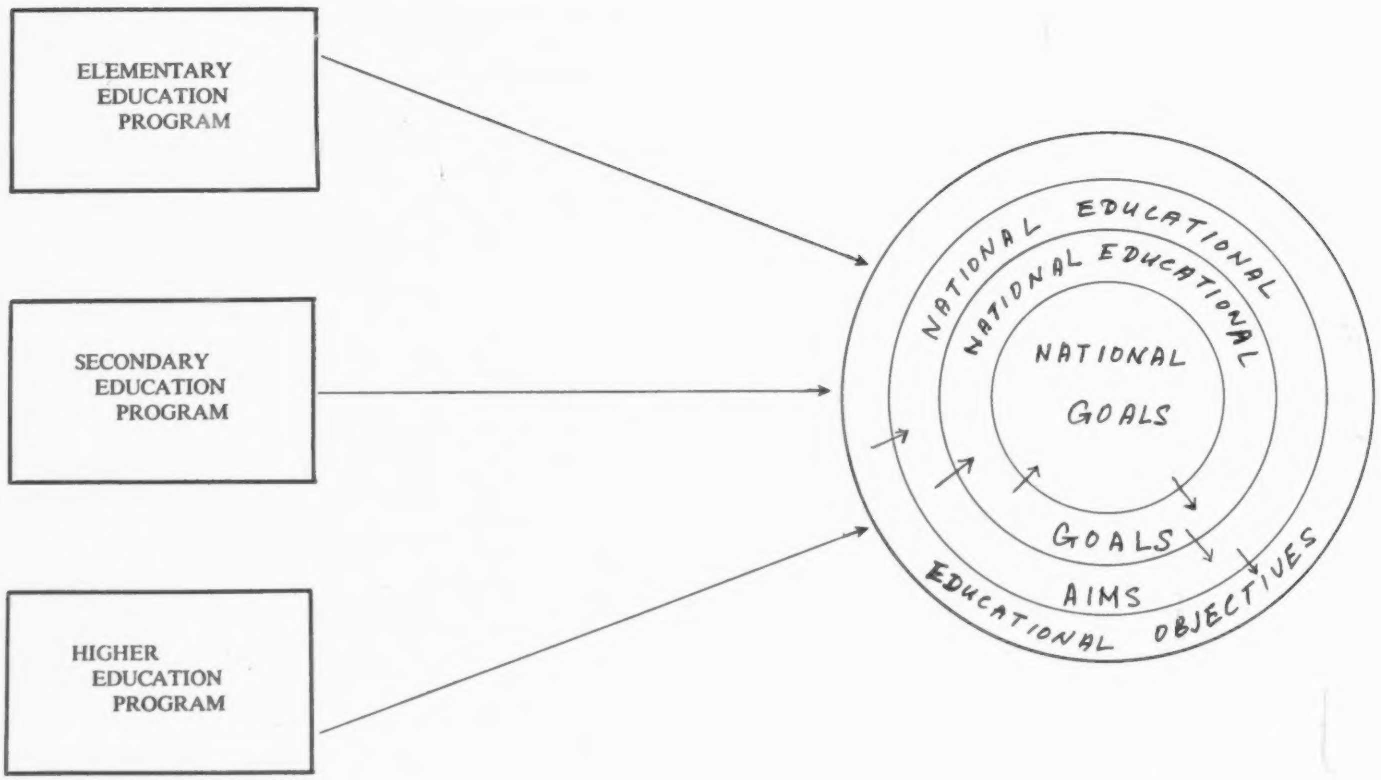
WORK FLOW CHART FOR HYPOTHESIS NO. 2

H_2 — There are no permanent educational objectives, they change with the needs of the times.

(Time Span Involved — 1935 to 1971)


Study chronological arranged summary of educational objectives by periods. 1
A. List national policies of BNE DE.
B. Determine which educational policies prompted their formulation 2
Summary of national policies that prompted their formulation. 3
Survey of forces subsumed under community ferment (external and internal) by period. 4
Determine which forces under community ferment greatly influenced their formulation. 5
Summary of forces under community ferment that prompted their formulation. 6
Study of researches and surveys of Education by periods. 7
Determine which researches and surveys greatly influenced their formulation. 8.
Summary of researches and surveys that prompted their formulation. 9
Study of national government policies. 10
Determine which policies greatly influenced their formulation. 11
Summary of government policies that prompted their formulation. 12
Summary of 3, 6, 9 and 12. 13
NATIONAL TASK FORCE REVIEW
Final Draft for International Task Force.

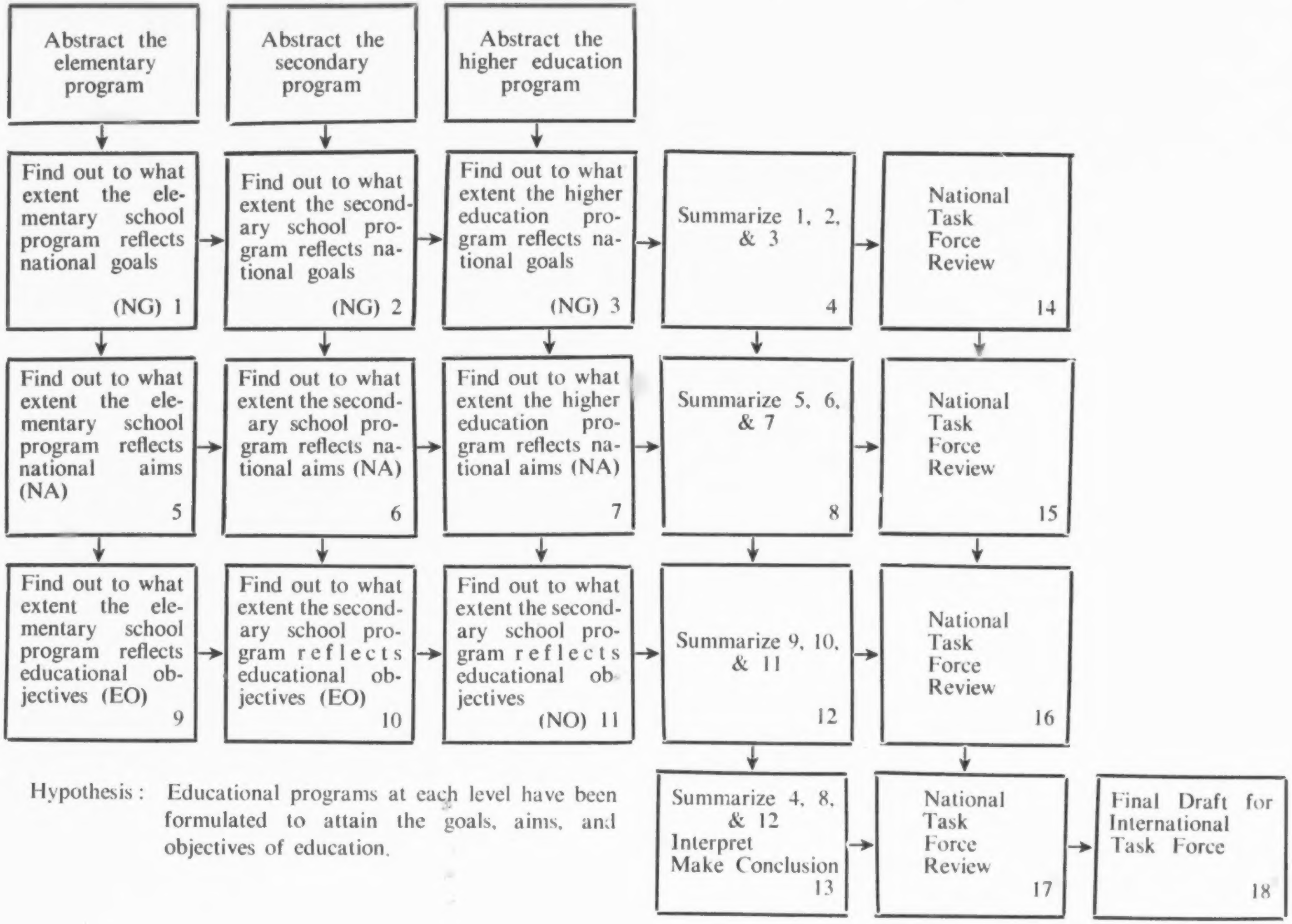
MODEL FOR HYPOTHESIS 3


ELEMENTARY EDUCATION PROGRAM
SECONDARY EDUCATION PROGRAM
HIGHER EDUCATION PROGRAM
NATIONAL EDUCATIONAL
NATIONAL EDUCATIONAL
NATIONAL
GOALS
GOALS
AIMS
EDUCATIONAL OBJECTIVES

HYPOTHESIS 3

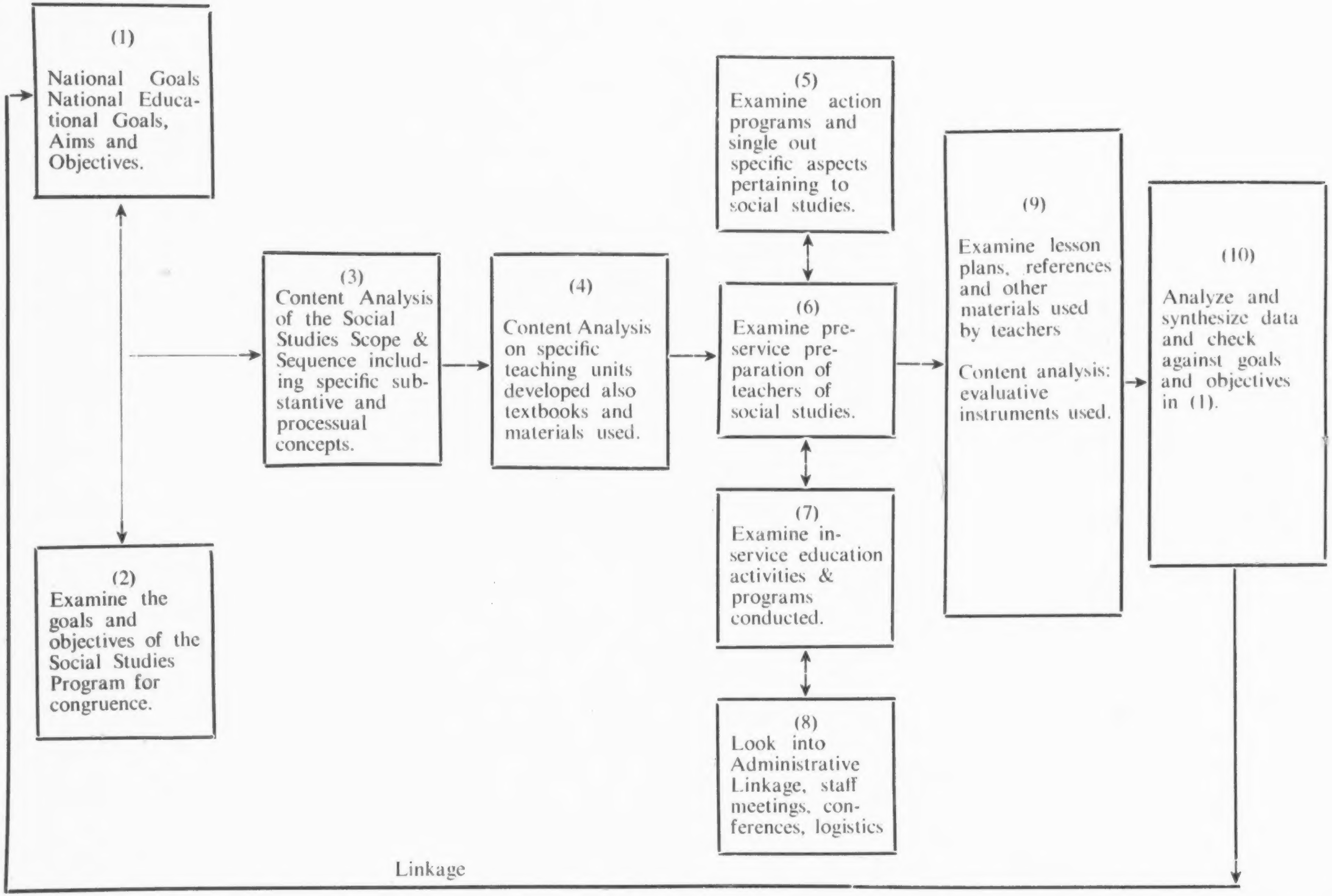
Educational Programs of Each Level have been formulated to attain the goals, aims, and objectives of education.

WORK FLOW CHART FOR HYPOTHESIS 3


Abstract the elementary program
Abstract the secondary program
Abstract the higher education program
Find out to what extent the elementary school program reflects national goals (NG) 1
Find out to what extent the secondary school program reflects national goals (NG) 2
Find out to what extent the higher education program reflects national goals (NG) 3
Summarize 1, 2, & 3 4
National Task Force Review 14
Find out to what extent the elementary school program reflects national aims (NA) 5
Find out to what extent the secondary school program reflects national aims (NA) 6
Find out to what extent the higher education program reflects national aims (NA) 7
Summarize 5, 6, & 7 8
National Task Force Review 15
Find out to what extent the elementary school program reflects educational objectives (EO) 9
Find out to what extent the secondary school program reflects educational objectives (EO) 10
Find out to what extent the secondary school program reflects educational objectives (NO) 11
Summarize 9, 10, & 11 12
National Task Force Review 16
Summarize 4, 8, & 12 Interpret Make Conclusion 13
National Task Force Review 17
Final Draft for International Task Force 18

Hypothesis : Educational programs at each level have been formulated to attain the goals, aims, and objectives of education.

WORK FLOW CHART FOR HYPOTHESIS 4


(1)
National Goals National Educational Goals, Aims and Objectives.
(2)
Examine the goals and objectives of the Social Studies Program for congruence.
(3)
Content Analysis of the Social Studies Scope & Sequence including specific substantive and processual concepts.
(4)
Content Analysis on specific teaching units developed also textbooks and materials used.
(5)
Examine action programs and single out specific aspects pertaining to social studies.
(6)
Examine pre-service preparation of teachers of social studies.
(7)
Examine in-service education activities & programs conducted.
(8)
Look into Administrative Linkage, staff meetings, conferences, logistics
(9)
Examine lesson plans, references and other materials used by teachers
Content analysis: evaluative instruments used.
(10)
Analyze and synthesize data and check against goals and objectives in (1).
Linkage

HYPOTHESIS 4 — The Implementation Dimensions of the Curricular program Indicate that the Objectives, Aims, and Goals are being achieved.

TABLE I : CONTENT ANALYSIS OF NATIONAL OBJECTIVES IN SOCIAL STUDIES

National Educational Goals in Social Studies	NATIONAL GOALS					
	Political Stability	Social Dev't.	Economic Dev't.	Human Resources Dev't.	Cultural Dev't.	TOTAL
To develop a good and effective citizen in a democratic society who :						
1. Has an inquiring mind	X	X		X		3
2. Is well-informed and useful	X	X				2
3. Participates in the solution of social, economic and political problems.	X	X	X			3
4. Advances the cause of nationalism through understanding, appreciating, perpetuating, and developing what are desirable in our national heritage and ideals.	X	X			X	3
5. Has strong moral and spiritual values.	X	X		X		3
6. Respects the dignity and worth of the individual regardless of race, religion or socio-economic status.	X	X			X	3
7. Understands the value of the inter-dependence of peoples and the need for international cooperation in the attainment of world peace.	X	X				2
TOTAL	7	7	1	2	2	19

TABLE II: SUMMARY DISTRIBUTION OF CONCEPTS DERIVED FROM THE SOCIAL STUDIES SCOPE AND SEQUENCE (1970) FOR THE THREE LEVELS

CONCEPTS	NATIONAL GOALS					TOTAL
	Political Stability	Social Dev't.	Economic Dev't.	Human Resources Dev't.	Cultural Dev't.	
1. Change	3	17	5	6	6	37
2. Role	6	19	1	5	0	31
3. Interaction	3	16	2	3	3	27
4. Institutions	10	16	2	2	2	32
5. Societal Control	11	12	1	3	0	27
6. Faith in God, Love of Fellowmen, etc.	0	23	1	6	0	30
7. Human Worth, Dignity, Rights......	13	18	1	7	0	39
8. Political Ethics	12	9	1	1	0	23
9. Heritage	0	4	1	4	13	22
10. National Identity	0	6	3	3	13	25
11. Economic Growth and Progress	0	18	11	8	1	38
12. Scarcity........	1	12	28	6	1	48
13. Adjustment.......	0	10	10	6	4	30
TOTAL	59	180	67	60	43	409

CONTENT ANALYSIS OF SAMPLE PERIODICAL TESTS, FOURTH YEAR

COGNITIVE LEVELS	NATIONAL GOALS					TOTAL
	Pol. Sta.	Social Dev.	Eco. Dev.	Human Res. Dev.	Cultural Dev.	
1. Knowledge						
2. Comprehension						
3. Application						
4. Analysis						
5. Synthesis						
6. Evaluation						
TOTAL						
PERCENT						

HANDOUTS

by Mrs. Eleanor Elequin

Obj. in Philippine Government (High School Level)	NATIONAL GOALS					
	Political Stability	Social Dev't.	Economic Dev't.	Human Resources Dev't.	Cultural Dev't.	TOTAL
A. Knowledge and understanding						
1. Know and understand his rights as a Filipino citizen.	1					1
2. Understand that the vigilance of a citizen is the foundation of a clean government.	1					1
3. Be an active participant in all affairs that concern the community	1	1				2
4. Understand and appreciate the advantages of a democracy	1					1
5. Know how to use the democratic and constitutional processes in social action	1			1		2
6. Know how the government functions in order to cooperate with it & to participate effectively in citizenship activities.	1			1		2
7. Know how the government will be able to function effectively & effectively reach the greatest number of people.	1					1
8. Know that an efficient government is sensitive to the needs of the people.	1	1	1	1	1	5
9. Know how we support our government.	1					1
10. Understand and be able to adjust to social, economic and political changes.	1	1	1			3
11. In emergencies know how to cooperate with the government & other citizens to prevent confusion, restore order, insure peace and protect property.	1			1		2

Obj. in Philippine Government (High School Level)	NATIONAL GOALS					
	Political Stability	Social Dev't.	Economic Dev't.	Human Resources Dev't.	Cultural Dev't.	TOTAL
B. **Skills**						
1. Knows how to think critically.				1		1
2. Knows how to use parliamentary processes in arriving at group decisions.				1		1
3. Practices tolerance and respects the worth and dignity of the individual in democratic human relations.	1			1		2
4. Knows how to work with others by listening to what they have to say, and respecting their opinions and abiding by the decisions of the majority.				1		1
5. Knows how to construct, explain and interpret visual aids such as charts, graphs and tables.				1		1
6. Can talk properly before a group and communicate his ideas clearly.				1		1
7. Is able to appraise the services of public servants and to encourage the free flow of information.				1		1
8. Learns how to use various tools of knowledge such as almanacs, encyclopedias, yearbooks to get further knowledge about government.	1			1		2
9. Uses other text and references to verify a fact, compare ideas and improve conclusions.				1		1
Total	13	3	2	13	1	32

Obj. in Philippine Community Life (High School Level)	NATIONAL GOALS					
	Political Stability	Social Dev't.	Economic Dev't.	Human Resources Dev't.	Cultural Dev't.	TOTAL
1. Acquisition of functional knowledge through an understanding of the physical, social and spiritual aspects of community life and the life of the individual in an ever-changing society.		1		1	1	3
2. Enhance the development of habits and skills in analyzing situations recognizing a problem, setting up of objectives, planning and doing simple researches, conducting surveys of field trips, utilizing the material, physical and human resources, making evaluations, conclusions and generalizations.			1	1		2
3. Produce an increasing growth in reading, language and writing for the power to use basic facts.				1	1	2
4. Attainment of desirable attitudes and appreciations, standards and ideas which will make the student better prepared to participate in the community life.	1	1		1		3
5. Develop courage to express an honest opinion and respect of others, analytical mind in evaluating existing conditions, cooperation in meeting group needs; growing intellectual curiosity and interest in the fields of science, history, literature, democratic behavior in all human relations, active participation in civic activities, and appreciation for the attributes of good membership in the home, school and community.	1	1		1	1	4
TOTAL	2	3	1	5	3	14

Objective for World History (High School Level)	NATIONAL GOALS					
	Political Stability	Social Dev't.	Economic Dev't.	Human Resources Dev't.	Cultural Dev't.	TOTAL
1. Trace important developments in human progress in such an interesting and orderly manner that will enable us to enjoy the rich experience of conscious enlargement of vision and growth of the soul.				1		1
2. Realize how impossible it is for us to live in this world without being affected by what has happened and what is happening in all quarters of the world.		1				1
3. Understand that important events in world history take place through several centuries simultaneously and that the histories of all countries are somehow linked with one another.	1				1	2
4. Appreciate those who have made history for us as well as those who have recorded it and realize the value of intelligent and accurate recordings.	1				1	2
5. Appreciate the major contributions of race, nations and individuals to our present culture.	1	1			1	3
6. Enable us to think of ourselves as citizens of the world as well as of our country and to realize the possibility of making valuable contributions to the progress of humanity.		1		1		2
TOTAL	3	3		2	3	11

Source: Bureau of Public Schools, "Course of Study for World History," 1962, p. 1.

Objectives in Philippine Problems (High School Level)	NATIONAL GOALS					
	Political Stability	Social Dev't.	Economic Dev't.	Human Resources Dev't.	Cultural Dev't.	TOTAL
1. Use techniques and methodology of the problem method.				1		1
2. Develop realistic acquaintance with Philippine problems.				1		1
3. Recognize social, economic, educational and political trends and present formulations of new problems accordingly.	1	1	1	1	1	5
TOTAL	1	1	1	3	1	7

Memo. No. 89s. 1960.

Objectives in Philippine History	NATIONAL GOALS					
	Political Stability	Social Dev't.	Economic Dev't.	Human Resources Dev't.	Cultural Dev't.	TOTAL
A. Knowledge & Understanding & Appreciation						
1. Understand the position of the Philippines in SEA.	1					1
2. Know the resources of the Philippines, their potentials and their conservation.			1	1		2
3. Understand the recent background and characteristics of the Filipino people.				1		1
4. Understand the contribution of Spain to Phil. civilization.					1	1
5. Understand how the Filipinos helped to maintain Spanish power in the Philippines and how they were rewarded for it.	1	1				2
6. Understand how the improvement of world communication and transportation affected the economic and intellectual progress of the Philippines.			1	1		2
7. Know the causes that led to the Philippine Revolution.	1					1
8. Understand the ideals of the Philippine Revolution.	1					1
9. Appreciate the role of the Filipino revolutionary leaders in unifying the peoples for a common cause.				1		1
10. Appreciate the achievement of the Philippine Revolution.	1					1
11. Understand the causes that led to the Filipino-American war.	1					1
12. Appreciate how Americans cooperated with Filipinos in developing self-government in the Philippines.	1					1

Objectives in Philippine History	NATIONAL GOALS					
	Political Stability	Social Dev't.	Economic Dev't.	Human Resources Dev't.	Cultural Dev't.	TOTAL
13. Understand how the Filipino's way of life—economic, social and cultural has been influenced by American democracy.		1	1		1	3
14. Understand why the Philippines was involved in World War II.	1					1
15. Understand why the Japanese never succeeded in winning the Filipinos to their side in World War II.	1					1
16. Understand how Filipinos resisted the Japanese invasion and its importance.				1		1
17. Appreciate America's fulfillment of her promise to liberate the Philippines, how subsequent peaceful grant of independence and its influence of all freedom loving peoples.	1					1
18. Understand and appreciate friendly Filipino-American relations.	1					1
19. Understand that the Philippines being a member of the family of nations has obligations such as helping to accomplish the objectives of the United Nations and UNESCO.	1	1	1		1	4
20. Understand and appreciate privileges that go with independence.	1					1
21. Understand that the Philippines has been built on the sacrifices of its leaders.				1	1	2
22. Understand that a nation is great because of its experiences and strong if it has learned to profit from its experience.	1			1		2
23. Know our limitations and improve upon them.				1		1

Objectives in Philippine History	NATIONAL GOALS					
	Political Stability	Social Dev't.	Economic Dev't.	Human Resources Dev't.	Cultural Dev't.	TOTAL
24. Appreciate the Philippine cultural heritage in our literature, music, fine arts and traditions.					1	1
25. Preserve and enrich this cultural heritage for future generations.					1	1
26. Love and have pride in our country.	1				1	2
27. Cooperate and work with others, realize national objectives for the common welfare.	1	1	1	1	1	5
28. Remember always that as an independent people, our destiny is in our hands.				1		1
29. Understand the meaning of current affairs in the Philippines and how they affect our lives.	1	1	1			3
30. Understand the meaning of world current affairs and how these events affect the lives of the Filipino people and Phil. relations with other countries.	1	1	1			3
31. Understand the latest world developments in arts and sciences, discoveries and inventions and how Filipinos can profit from them.				1	1	2
Skills						
1. Ability to outline an assignment.				1		1
2. Ability to interpret a map of the Phil.				1		1
3. Ability to organize a Social Studies Report.				1		1
4. Ability to make, construct, and interpret graphs, charts, etc.				1		1
5. Ability to get the thought of a paragraph in books and newspapers.				1		1
6. Ability to talk before a group of people and communicate ideas clearly.				1		1
7. Ability to use other charts, texts and references in Phil. History to verify facts, compare ideas and form sound generalizations.				1		1
TOTAL	18	6	7	18	9	58

MATHEMATICS CURRICULA IN 1990

by

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I did not choose the title. It was chosen for me. I do not wish to pretend that I can prophesy. According to statistics, unless you predict often enough, otherwise your chance of being correct will always be very small. Therefore what I am going to say is what I like to see happen in twenty years' time and hopefully it might actually happen.

You may all have heard about the fairy tale of the birth of Modern Maths. Some years ago when the Russians successfully sent up their first sputnik, it started the Americans thinking why they did not do it first. They did some research about it and found out that the reason was because the Russians took mathematics more seriously. Since then we have gone through a whole series of mathematical reforms and we are still in the middle of it.

What is modern maths? Is it really better? You may have heard a great deal about it already. So instead of repeating what others have said, I would first of all clear up a few misconceptions.

We seem to think that in Europe or America every school is teaching modern maths. In fact, this is not true. According to a recent survey of some schools in Britain (I.M.A. Bulletin 1971), only one third of those schools were teaching modern maths. The other two thirds were not. Some schools even switched back to traditional programme after trying out the modern one. The reform is still in progress. However, it is true that the number of students taking up modern maths is increasing very rapidly in Britain.

Secondly, one might think that mathematics is international. Everywhere students are taught more or less the same thing. You will be surprised to find that, again, this is not true. In a study of mathematics curricula of fifteen European countries (European curriculum studies No. 1 Mathematics, Council of Europe publication 1968), it was found that only a very small number of mathematical topics were common to all of the countries. Of course, the situation may have changed now since the study was undertaken at a time when curricula and syllabuses were rapidly evolving.

Thirdly, the term " modern maths " seems to imply that everything in it is modern. In actual fact, a good deal of it is really traditional. Perhaps in some cases the approach may be different. Again, the so-called teaching by discovery method is not altogether new either. A lot of experienced teachers were using it before. So modern maths is not all that modern really. What is modern is perhaps the difference in emphasis from that of the traditional one.

I DO AND I UNDERSTAND

Normally we are led to believe that we can study mathematics with only paper and pen. One of the essential differences in modern maths is that it is regarded as an experimental science. For example, in primary schools pupils may be asked to draw up a statistical table or diagram about the height or weight of pupils in the class. At secondary level, many schools teaching modern maths have so-called mathematics laboratory. In contrast to what people believe, in modern maths we try to bring it alive again and not to drive it away from reality. I do not see why we should not include, for example, some practical mathematics into our mathematics curriculum. It is said that the change to modern maths is due to the changes that happen in the university. But please do not forget that only a minority of the secondary school students will eventually go to the university, and the majority of them will not. Therefore it is obvious that our mathematics curriculum should also be relevant to the majority.

The following sentences are frequently quoted :

> I listen and I know,
> I see and I believe,
> I DO and I understand.

The emphasis is on the word " DO ". This I think represents truly the spirit of modern maths.

MANIPULATION AND CONCEPTS

Once a well-known comedian joked that nowadays students after learning modern maths know all the concepts very well but cannot count. I think there is some truth in this. Certainly, it is important to understand concepts well and to know what a proof is. On the other hand, over-emphasis on rigor can kill a student's intuition. He dares not more one step forward without thinking why. This is bad. After all, many great ideas in science and mathematics were discovered by intuition. The rigorous proof came only afterwards. I favour the introduction of more logical reasoning into our mathematics curriculum. But I feel that in some modern programmes there is too much of it. In the next twenty years I would like to see these programmes becoming more balanced. In other words, concepts should be emphasized, but manipulation should not be abandoned.

GEOMETRY

One of the drastic changes in school mathematics syllabus is geometry. It is no longer dominated by Euclidean geometry. Different programmes suggest different answers. For example, the school Mathematics Project strongly advocates transformation geometry in place of the traditional Euclidean geometry. University of Illinois Committee on School Mathematics favours a vector approach. There are however other variants. Previously geometry was taught as a subject which helps to train students' logical thinking. Now it is more easily done in algebra. But still geometry should not be reduced to a minimum.

SEAMEO-RECSAM
SEMINAR FOR SENIOR NATIONAL ADMINISTRATORS
14-20 MARCH 1972

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Mr. Ishak bin Haji Pateh Akhir, Chairman of the Governing Board declaring the Seminar open.

RECSAM Staff and Participants at the Opening of the Seminar.

Mr. Chin Pin Seng, Director of RECSAM addressing the Plenary Session at the Seminar.

Delegates and Observers at the Seminar.

RECSAM Staff and Observers during a Plenary Session.

Dr. Fatimah H. Don. presenting her Paper at the Seminar.

There are complaints from some university teachers that the new breed of students lack the spatial intuition. The problem of what to teach in school geometry is not quite settled yet. I believe and hope that in twenty years time, the problem will be more settled though it does not mean that there will be uniformity.

NUMERICAL METHODS

Applied mathematics now no longer means only mechanics. Statistics is commonly taught in schools. Some numerical methods are also introduced. Roughly speaking, there are three types of mathematical problems : (a) One that has an exact answer, (b) One that has an exact answer but not easy to obtain, so we solve for its approximate answer, and (c) One that does not have a solution at all, but still we can give a conditional answer if we assume certain conditions. The last one belongs to probability theory and it is difficult to teach at elementary level. Normally people associate mathematics with only the first type of problems. However, the second one is becoming increasingly important and useful. This I think should be included in our mathematics syllabuses. Though it is already creeping in in some other countries, as far as I am aware of it is still new to the SEAMEO countries. Though some countries have gone beyond that to include computer in the curriculum, it might take a long time to come to this region. I feel that the least we can do is to introduce numerical calculation into our syllabuses.

SYLLABUSES, TRAINING OF TEACHERS AND EXAMINATION

We cannot consider mathematics syllabus in isolation. How we teach it is also very important. For example, there are good music and bad music. A jazz well played is good music, whereas Beethoven symphony poorly performed is bad music. So I would rather see traditional mathematics properly put across rather than modern mathematics badly taught. There is a difference between what should be and can be. Hence we should consider the training of teachers together with the introduction of new syllabuses. For modern maths, teachers have to be retrained or at least such opportunity should be provided for.

Having new syllabuses and properly trained teachers are still not sufficient. Examination also plays a very important part. Someone suggests that I should use the word evaluation. But I do not mean that. I do mean specifically examination. A lot of young and enthusiastic teachers find that they cannot put in practice what they have learned in training college, simply because there is so much pressure from the examinations. Every effort will be lost if we do not regard examinations as part and parcel of the whole scheme. After all examination is a specialist job and should not be dismissed lightly. I believe unless and until we have solved the problem of examination we cannot effectively carry out any new programme.

There are other problems as [illegible] example, textbooks. I think most of the countries in the region solve the problem by adapting text-books from other countries. Some problems are beyond our control, for example, the social problem as reported by Professor Soehakso from Indonesia at a previous RECSAM seminar (Seminar on Science Curriculum Development and Evaluation in Southeast Asia, Penang, September 1970).

SUMMARY

In short, I have brought out the following points.

1. Mathematics should be and I hope will be regarded as an experimental science.

2. In modern programme concepts and rigor are important but should not be over-emphasized.

3. Geometry should change but it should not be over-whelmed by other newly introduced topics.

4. We should include numerical methods in our mathematics syllabus.

5. We should consider training of teachers and examination in close relation with modern curriculum.

The mathematics curriculum is not static. Also, there are more than one solution to the problem. What we do in 1972 is only to provide one approximate solution. What we hope it will become in 1990 will only be the second approximation. I am confident the second approximation will be a better one.

AREAS OF PRIORITY IN CURRICULUM DEVELOPMENT

by

Dr. Fatimah Hamid Don

A question that is often asked by planners and educators in newly-emergent and developing nations nowadays can perhaps be expressed in the following terms: How can we provide for changes and improvement in our curriculum so that our schools can produce the manpower that enables us to fashion national, economic, political and social life to best meet the needs of a modern world? Towards this and similar ends various strategies are being tried and sought. By strategies is meant the methods, approaches and maneuvers used to accomplish a curriculum change within a given social content. One such strategy is that given in the following statement by the Director of RECSAM. " Countries in this region are giving top priority to the teaching of science and mathematics with the objective of harnessing potential manpower, especially at school level, for their national, economic, and social development ".

Such ad hoc procedures have characterized many recent attempts at curriculum reform or improvement. The alphabet soup of curriculum in the U.S. — BSCS, CBA, ESS, PSSC, SMSG* is testimony to this. In fact, as Goodlad (1966) says, curriculum planning has been and is still a trial-and-error business, guided at best by percepts derived from experience. There are as yet no conceptual schemes or interconnected concepts comprising a science of curriculum. Consequently, research tends toward the " dust-bowl empiricism " variety, and, as a consequence, is not yet cumulative.

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* Biological Sciences Curriculum Study, Chemical Bond Approach, Elementary Science Study, Physical Science Study Committee, and School Mathematics Study Group.

There is nothing wrong with ad hoc measures for short-range planning. No doubt, the emphasis on maths and science teaching is essential in order to correct existing imbalances in the existing curriculum. But sooner or later the question should be asked: Is the emphasis on maths and science alone sufficient to provide for a balanced curriculum effective for meeting national needs? Would it not create other imbalances as is now felt in some developed nations, and which are now tending towards a more humanistic emphasis?1 Are our humanities and social sciences/studies curriculum inadequate, both for the learners and for the society? For long term considerations, therefore, we need a comprehensive conceptual framework to guide curriculum planning, research and development. A conceptual framework should facilitate the following: (1) the identification of problems and questions presumably having relevance to planning any educational programme; (2) the clarification of types of inquiry likely to be productive in dealing with these problems and questions; (3) the revelation of possible connections among these problems and questions; (4) the identification of promising data-sources for dealing with these problems and questions; and (5) the initiation of processes designed to reveal the relevance of these sources of data extracted from them to the problems and questions classified by the system. (Goodlad 1966).

What are the purposes of education? As a vital force in human affairs, education, pragmatically viewed, serves two major purposes: (1) the development of the individual, and (2) the development of society. Neither one should be viewed in exclusion of the other. Early theorists had tended to create a dichotomy between the two, manifiesting in either the child-centred, or the society-centred curriculum. However, contemporary thought rejects such a dichotomy, but regards each aspect as "one leg of a bipedal organism that moves forward in dynamic balance". (Hanna, 1968) curriculum, which is "all of the planned experiences provided by the school to assist pupils in attaining the designated learning outcomes to the best of their abilities". (Neagley and Evang 1967) must be conceptualized within a framework in which all interracting and organizing data relating to the subject-matter, the learner and learning processes, and societal priorities are viewed as a whole. To quote from Goodlad (1966) " By a conceptual system, I mean a carefully engineered framework designed to identify and reveal relationships among complex, related and interacting phenomena; in effect, to reveal the whole where wholeness might not otherwise be thought to exist". Such a system would provide the basis for balance in curriculum organisation, thus avoiding the familiar swing of the pendulum from child-centred to subject-centred or society centred extremes.

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* Post World War II Curriculum reform in U.S. made sweeping changes in Mathematics and the natural sciences. The National Science Foundation continues to support these fields, with the U.S. Office of Education recently moving vigorously in to support of English and the Social sciences. The humanities continue to lag in spite of growing support from private foundations and the Federal Government. Goodlad writes: "Our neglect of the arts in school has bordered on becoming a national disgrace. Nothing short of a renaissance in the humanities will balance the curriculum".

Ralph Tyler (1950) in drawing up a rationale for the development of curriculum and instruction sets the basis for curriculum deliberation in terms of four questions for which answers are to be sought; these are :

1. What educational purposes should the school seek to attain?

2. What educational experiences can be provided that are likely to attain these purposes?

3. How can these educational experiences be effectively organised?

4. How can we determine whether these purposes are being attained?

These questions deal with (1) the objectives to be attained, (2) the learning opportunities or experiences to be provided; (3) the kind of organisation that can being about effective learning; and (4) the evaluation of all curricular efforts in terms of the objectives to be attained.

The task of developing curriculum actually involves various levels of decision-making in terms of levels of remoteness from the learner for whom the curriculum is intended; these correspond to the societal level, the institutional level, and the instructional level. Societal level decisions concern the broad and general aims of education on the basis of societal values and priorities as data sources. These broad aims are then translated into educational objectives by institutional (Ministerial-level) on the basis of such data sources as the disciplines of knowledge, the learner, and societal priorities. These objectives are expressed in statements bearing a " behavioural " component and a " substantive " component. At the specific instructional (school and classroom) level, teachers set out to state instructional objectives in precise and specific terms (behavioural objectives) in terms of learner cumulative attainment through the grades. The data-sources at this level will include the psychology of the learner, his needs and interests, funded knowledge about the psychology of learning, content in the subject-matter areas, and values (societal and institutional).

Tasks involved in creating curricular systems

The development of curricular systems for a school involves the completion of the following sets of tasks :

1. The developing of working objectives for the schools, and

2. The identification of curriculum areas in which curricular sub-systems can be developed.

within each curricular area (sub-system) several tasks have to be carried out :

1. The specification of operating objectives for the area.
2. The development of plans for continuity and sequence.
3. The identification of instructional sequences or units.
4. The development of teaching strategies for the entire area and specifically for the instructional sequences, and
5. The preparation of assessment and feedback systems.

1. **Decisions about Objectives.**

In determining educational objectives, three basic referents must be considered. These are :

1. Who are we going to teach?
2. What are we going to teach to them?
3. Why are we teaching them what we want them to learn?

These three referents constitute the data-sources of the learner, the subject matter, and the society. What are some priorities in considering each of these data-sources.

The Learner as data-Source

Let us first take **the learner.** We should ask the question : What is it that the learner should have attained at the end of the educational program? The answer is : **knowledge and understanding, skills and competencies, abilities, attitudes and interests.** It is now increasingly realised that education should deal more than just the recall and rote-memorization of specific facts. Education should aim at facilitating the development of the child intellectually, emotionally and physically. On this basis three domains of behaviour have been identified (Bloom and Associates 1956, Krathwohl **et al,** 1964, and Simpson 1967) on which educational objectives should be derived. These domains are :

1. **The Cognitive domain** dealing with the development of intellectual abilities and skills. There are six levels : Knowledge, comprehension, application, analysis, synthesis, and evaluation.
2. The **affective domain** dealing with interests, attitudes, and values, and the development of appreciations and adequate adjustment. These comprise such behaviours as receiving, responding, valuing, organization and characterization.

3. The **psychomotor domain** dealing with the area of manipulative and motor skills. The levels identified are : perception, set (preparatory adjustment for particular action or experience), guided response (action under guidance of another individual), mechanism (some confidence and degree of skill in performance), and complex overt response (efficiency in terms of minimum expenditure of time and energy).

Recently it has been argued that if education is planning for future living, it would be extremely difficult to predict what kinds of behaviour would be most useful for the future adult. In a changing world **the only thing that is permanent is change.** Therefore we need to educate the individual to be ready to meet new situation, and to be able to adapt to change. Arising out of this is the emphasis for the education of the child to center around the ability to solve problems. It should teach him how to learn through exploration, testing, discovery by himself. Since it is felt also that many people will change occupations several times in their lives and will be called upon to learn more difficult skills (job and knowledge obsolescence) individuals had best attain the intellectual tools and the responsibility to direct their own learning at an early age. **Curriculum should emphasize learning how to learn,** this has been termed as "The Indispensable Skill".

Subject-matter as data source

To schools have been assigned the responsible task of providing learners systematic entry into the realms of knowledge. All levels of education, in fact, are given fundamental responsibilities; when linked together the various levels provide an introduction in depth to organized branches of knowledge. Schooling, however, is only an introduction; the pursuit of knowledge is a life long task.

The question is asked : What kind of knowledge should be taught? How do we go about selecting from the world's heritage of funded knowledge. Curriculum planners are no doubt aware of the phenomenon called the " knowledge explosion ". Knowledge is estimated to be doubling itself every 10 years. It is now not only difficult to select the important bits of knowledge to be taught, according to some, it is impossible. Coverage of a few topics would be futile. Knowledge obsolescene is another factor to contend with.

Knowledge **per se** no longer serves as adequate basis of curriculum. In this computer age, it is maintained, knowledge of all kinds can be stored in computers and retrieved almost instantaneously. The computer can also interpret these data according to innumerable relationships. How then do curriculum developers resolve this dilemma?

One of the most significant emphasis for curriculum development today is the need **to develop competence in using conceptual schemes and methods of inquiry** so that individuals can " go it on his own " and continue to learn through his lifetime. This new emphasis on developing the **ability to inquiry** has forced reconsideration of schooling as a systematic means of introducing individuals to domains of knowledge. The nature of knowledge has been restudied in order to get clues that might facilitate curriculum planning. The systematic ways in which man acquires, organizes, and uses knowledge have been examined to identify conceptual structures and methods of inquiry that should be used as foundations of instruction. From a psychological frame of reference the disciplines can be viewed as "cognitive maps" which, when understood by the child, make it possible for him to interpret meaningfully what ever phenomena he is confronted with. And since there are different disciplines, hence different maps, it becomes important for the child to use several so that his view of reality is both complex and subtle.

Efforts are being made to specify structural components of the various disciplines that can be used for designing curriculum. Structural components are viewed as those concepts, key ideas, principle generalizations, and methods of inquiry of the scholars characterizing a given discipline. The intent is to develop curricula that are logically organized around those concepts, key ideas, and methods of inquiry, which scholars believe to be most fundamental and powerful in their fields of specialization.

Several arguments have been made for curriculum to be designed on the basis of structural components derived from the disciplines. These include those by Bruner (1960), Heath (1964) Phenix (1964) Rosenbloom (1964) and several others. These may be summarized briefly as follows :

1. Economy of learning is enhanced by the focus on fundamental idea and use of content to develop key ideas.
2. The relationship among ideas is highlighted as a sense of structure emerges through the use of concepts and generalizations in active inquiry.
3. Fundamental ideas are brought to bear upon the solution of problems, and current problems are used to extend the understanding of the key ideas.
4. Transfer of learning is facilitated as concepts and generalizations of broad applicability are stressed.
5. The curriculum will be up to date because of the close liason with scholars in the basic disciplines.
6. Teaching strategies and basic study skills may be closely linked with methods of inquiry drawn from the disciplines.
7. Motivation is heightened as lure of discovery is made part of instruction.
8. Better articulation is achieved between instruction in schools and institutions of higher learning.

9. The role of the school is kept in sharper focus as emphasis is given to cognitive and affective outcomes to be attained through the pursuit of knowledge via discipline modes of inquiry.

How have structures of the disciplines been identified? Broudy (1954), Bruner (1960) Forshay (1961) Schwab (1964) Bellack (1963) King & Brownell (1966) have presented various points of view of the concept of structures as related to the disciplines of knowledge. Others have focussed attention on specific disciplines : e.g. Schwab, the structure of the natural sciences; Lange, the structure of mathematics, Wilson, the structure of English and Scriven, the structure of the social studies, in a book of reading entitled **The Structure of Knowledge and the Curriculum** edited by G. W. Ford L. Pugno.

Society as a curriculum Data-source

Curriculum planning decisions must necessarily involve conception about the operation and function of education in relationship to specific activities and goals of the society it serves. It is the interaction of aims and social forces outside education and makes educational planning most complex of all societal institutions. " Education for What " represents a major dilemma.

a. The Manpower Concept

Every nation is concerned with the relationship between its educational system and employment. A school system has two kinds of out-put :

(1) Graduates and school-leavers who complete the education program, and

(2) Persons, who for lack of a better word, are called " dropouts " — persons who do not complete the program of education which they began.

These two products are either absorbed in the active population and labour force or else become part of the inactive population. Both active and inactive groups may at sometime enroll in programmes for continuing education or may be trained or retrained through informal on the job programs.

The essence of manpower approach to educational planning consists in reviewing occupational composition by level of educational attainment of the active population and then stating that certain levels of educational preparation are the **" required "** or desired for certain occupations.

b. The Problem of Drop-outs

The high % of dropout in this country needs no emphasis. Barring out poverty which is undeniably a major factor, the dropout phenomenon exist either because of the lack of motivation, or because of inadequacies of schooling. Perhaps, the schools do not supply youth with the kind of education that will enable them to participate in work-oriented activity. We should then ask the question : Is the secondary school conceived as producing a work-oriented heterogeneous student output, or is its main purpose to prepare students for post-secondary education?

The problem is not merely with vocational education conceived as a kind of " liberal " training for those who are unable to master academic programmes. It is also the need to develop a new kind of employment-oriented training for those who will not continue in post-secondary institutions, or will elect occupation oriented training in vocational colleges.

The following are some considerations for curricular decision-making :

— The school certificate holder who does not enter college needs not only knowledge enough to be a responsible citizen, but skills enough to get and keep a job.

— Too many school leavers find that they have no job skills, or only marginal skills, or skills which are not really needed in their communities.

— The school certificate should not be a ticket to frustration.

We need to improve the vocational aspect of our education programs. We must build stronger links between the schools and their students, and between students and local industries and employment services so that education will have a direct relationship to the world the completing or graduating student enters.

Many people, particularly those in educational establishment confuse education with formal schooling as an end in itself. The acquisition of knowledge, the development of productive skills, and the mastery of occupational tasks depend on many variables and institutions. **Public education must be guided by and geared to the exogenous demand for its products** — the educated people who are needed by society in the world of work. This calls for a cooperative effort on the part of the educational institution and other agencies, public and private employers to develop better occupation oriented education, and more efficient means to synchronize education with the nation's future manpower needs.

c. The Educational Gap Concept

The " educational gap " is defined as the gap between our best visions for education, and the actual conduct of schooling. For purposes of curriculum improvement it is essential to recognize that such a gap exists. We have to examine practices in the schools. Often there is a vast gap between assumptions as to what is desired and what is recommended practice, and what appear to be common classroom practice.

It is no use blaming teachers unduly. We have to look into the question as to who is responsible for what; whether there is a clear understanding or what schools are for by those in authority; whether strategies of educational change are complete, whether innovations recommended deal with only part of the school, and whether there is a lack of structure for developing new ideas, and to translating them to school innovations.

The " Systems " Way

The systematic approach to resource allocation begins with planning and planning involves defining objectives. Recent attempts at curriculum improvement seek to apply techniques of management that have proved successful in big corporations and businesses, to education. To proceed rationally it is felt, objectives must be defined in operational terms. It is not good enough to say that the objectives of education is "to develop the whole child", because it is not possible to determine how far this objective has been accomplished in any given period of time.

How can operational objectives be defined in education. This is a large order, and requires much data and much analysis. It requires in other words an **Educational Inquiry System.**

Let us now look at one process by which objectives may be defined. Supposed it is determined that the performance of a student during his entire school career is likely to be influenced strongly by progress in basic subject in the primary grades. (Investigation up to this time support this assertion). This finding could establish a high priority toward instruction in basic subjects in the primary grades. One such basic subject is **reading.**

Using the concept of operational objective as a measure of effectiveness of school programs, we might then state objectives in these terms :—

To seek the result each pupil achieve at least one year's advancement (as measured by tests of grade placement) in reading skills for each full year of school attended.

Up to this point we have only looked at the task of — determination and specification of objectives at the institutional level of generality. The development of more specific objectives of instruction — behaviorally-stated operational objectives or behavioral objectives — is quite another realm in itself. Why and how to write behavioral objectives is discussed in a paper which was presented at the National INNOTECH Seminar.

For considerations of detailed planning of curricular sub-systems, e.g. in subject areas, particularly in selecting content, in sequencing activities or experiences, and selecting of teaching strategies, data sources such as the psychology of learning, and notions about learning and how to promote it are pertinent.

The following represents some contemporary notions of learning in several curriculum projects :—

1. The traditional readiness concept of deferment of instruction until children mature is rejected in favour of the principle that pupils can be introduced to a subject as early as desired, provided it is presented properly and the pupils have the requisite background experience.

2. Transfer of learning and future learning are enhanced when emphasis is given to basic concepts, generalizations, and processes of inquiry of wide applicability.

3. The guided discovery of relationships by the student results in more efficient and permanent learning than do didactic approaches in which children learn about the conclusions reached by others.

4. Interest and motivation may be generated through the lure of discovery within the subject itself, not in peripheral matters, as students are guided to raise questions, discover relationships, interpret findings, formulate principles, and engage in other aspects of inquiry.

5. Meaningful verbal learning involves the organizing or structuring of facts into conceptual schemes or systems that can be used to generate ideas, raise questions, or make new interpretations.

6. Inductive approaches are favoured because of their value in promoting discovery through inquiry and giving experience in formulating generalizations, but deductive approaches are evident in experiences designed to develop skill in explaining new facts, formulating hypotheses, making inferences, and interpreting informations.

7. The study of selected topics in depth is more conducive to the discovery of relationship than is superficial coverage of masses of material.

8. Depth and breadth of learning are attained through recurring encounters with concepts, processes, theories, models and generalizations on higher cognitive levels and in new contexts.

9. Learning is enhanced when there is conceptual and process continuity from unit to unit and throughout a program of instruction.

10. The solving of problems by students aids concept development, develops the ability to put principles to use, and leads to the development of higher order principles.

11. Emphasis on the organizing or structuring of ideas helps students to develop a grasp of relationships, improving their ability to remember and retrieve ideas, provides a basis for generating new ideas, and promotes transfer of learning. (Michaelis, Grossman, Scott, 1967.)

Today's curricular innovations place a high premium on the role of knowledge in human affairs. There is increasing need for depth and viability in the knowledge acquired through the disciplines. Both the scientific and the humanistic are sought to provide for balance in the curriculum. The need to teach learners to learn on their own is being emphasized in view of changing societal needs and values, and to cope with the phenomena of knowledge explosion.

All these have manifested in the emphasis on developing understandings consistent with the structure of the disciplines. The following guidelines are provided as criteria for conduct selection on the basis of the above premises :—

1. What concepts, key ideas, themes and generalizations are essential to understanding the structure of each field of knowledge?

2. What content and activities are needed to develop insight into modes of inquiry used by scholars or experts in the field?

3. What content and materials are needed to develop independent study skills, laboratory and research techniques and critical and creative thinking abilities?

4. What content is needed to reveal limitations of existing knowledge, unsolved issues and problems and topics in need of study?

5. What content and activities are directly and indirectly related and relevant to national and societal needs?

In conclusion, I would like to say that, although I have not dealt with these issues directly, they are nevertheless being implied. These issues which should be given priority in considerations of curriculum planning and development are expressed as the **Four P's** — poverty, population, pollution and (world) peace.

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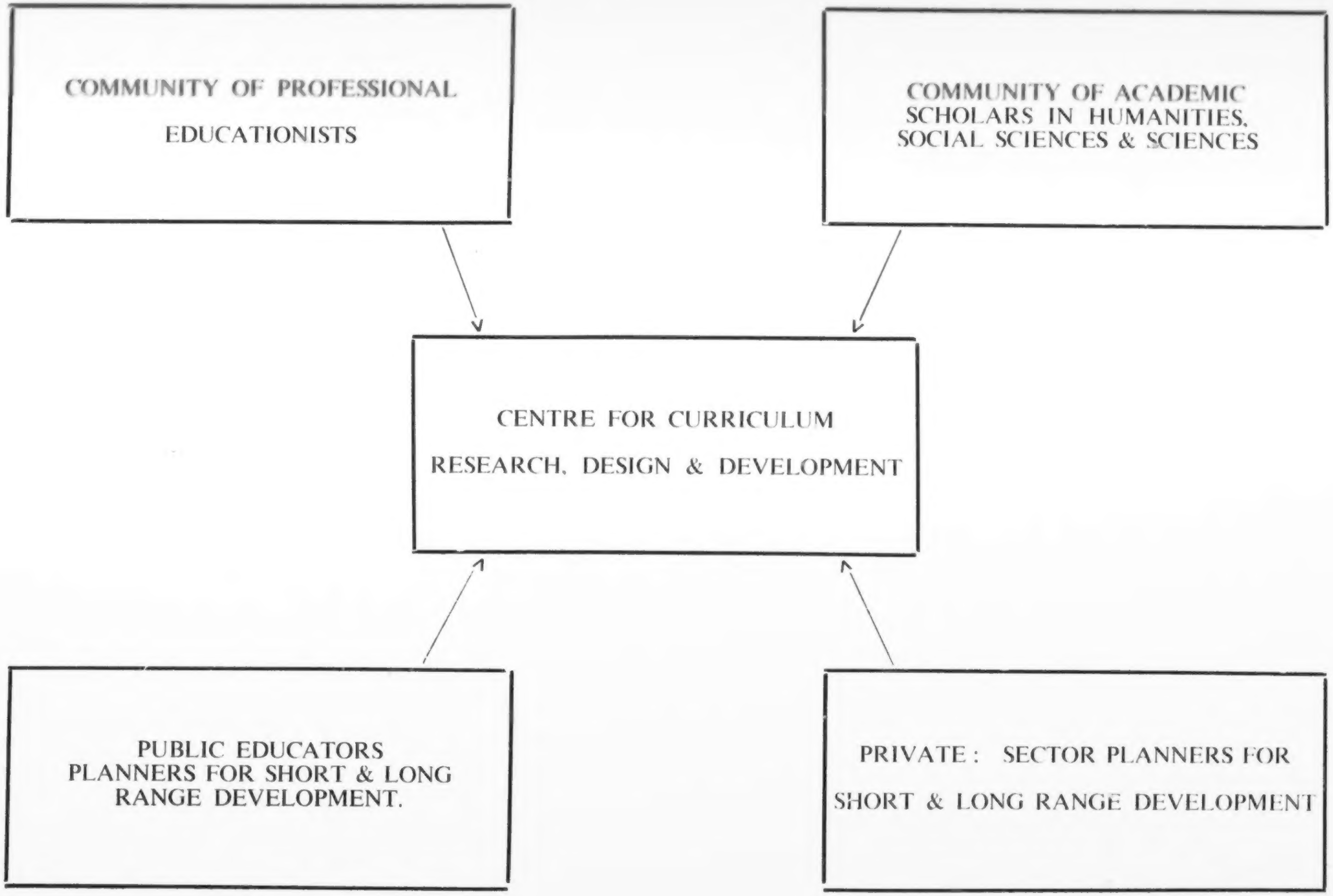
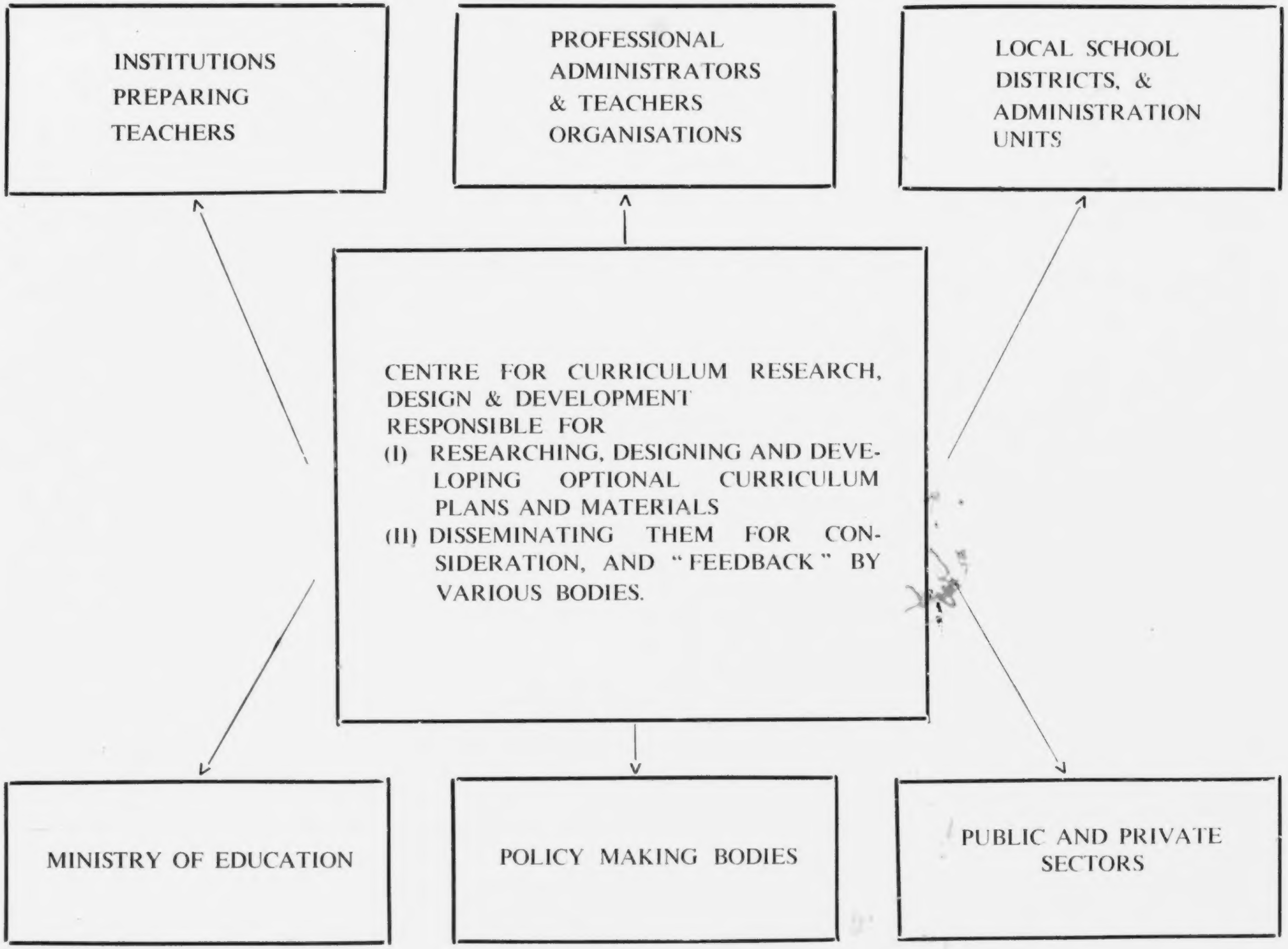
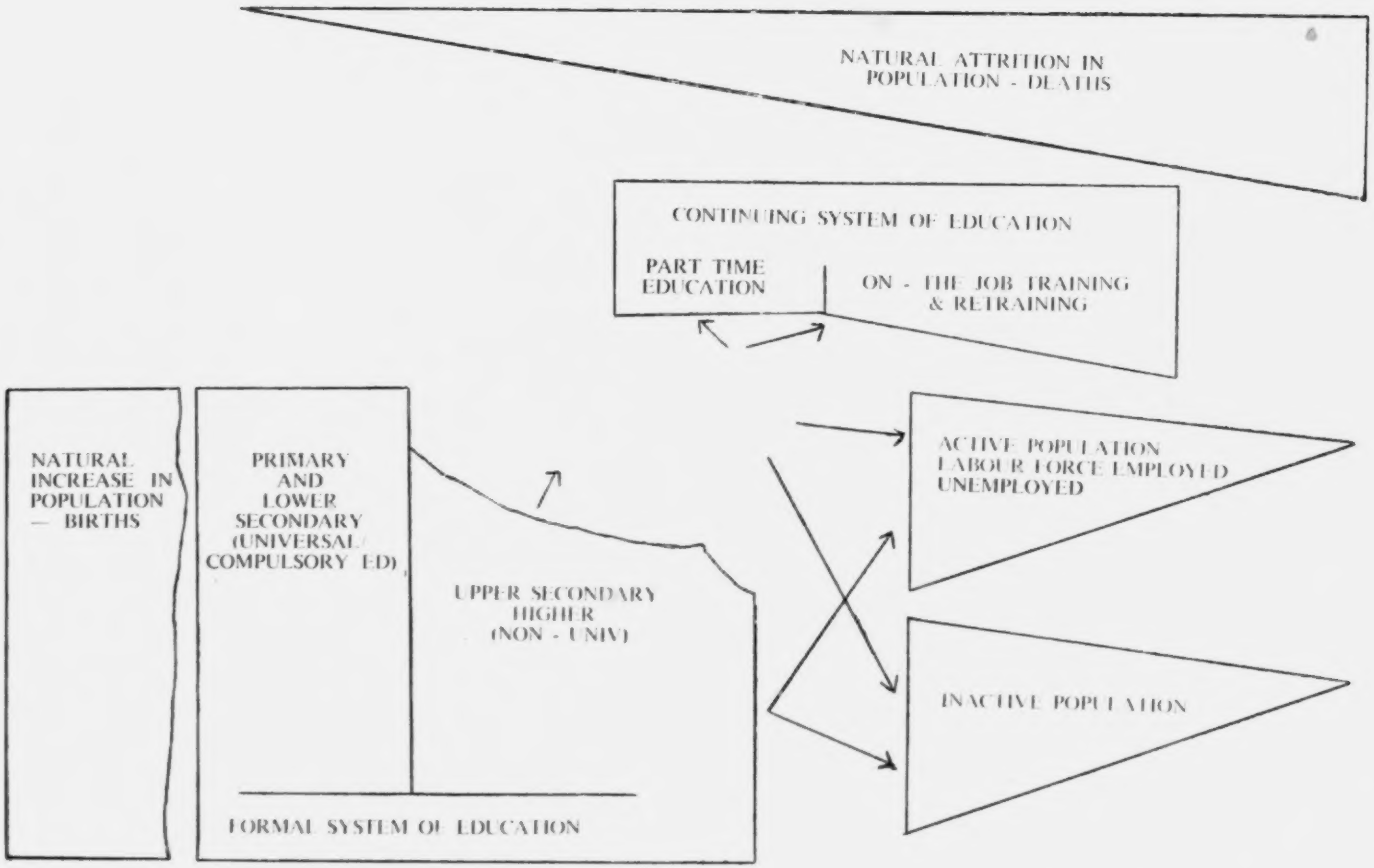
INPUT OF CURRICULUM CONTENT FROM DATA - SOURCES


COMMUNITY OF PROFESSIONAL EDUCATIONISTS
COMMUNITY OF ACADEMIC SCHOLARS IN HUMANITIES, SOCIAL SCIENCES & SCIENCES
CENTRE FOR CURRICULUM RESEARCH, DESIGN & DEVELOPMENT
PUBLIC EDUCATORS PLANNERS FOR SHORT & LONG RANGE DEVELOPMENT.
PRIVATE : SECTOR PLANNERS FOR SHORT & LONG RANGE DEVELOPMENT

OUTPUT OF OPTIONAL CURRICULUM DESIGNS AND RELATED MATERIALS


INSTITUTIONS PREPARING TEACHERS
PROFESSIONAL ADMINISTRATORS & TEACHERS ORGANISATIONS
LOCAL SCHOOL DISTRICTS, & ADMINISTRATION UNITS
CENTRE FOR CURRICULUM RESEARCH, DESIGN & DEVELOPMENT
RESPONSIBLE FOR
(I) RESEARCHING, DESIGNING AND DEVELOPING OPTIONAL CURRICULUM PLANS AND MATERIALS
(II) DISSEMINATING THEM FOR CONSIDERATION, AND "FEEDBACK" BY VARIOUS BODIES.
MINISTRY OF EDUCATION
POLICY MAKING BODIES
PUBLIC AND PRIVATE SECTORS

SCHEMATIC REPRESENTATION OF EDUCATION AND ITS RELATIONSHIP TO POPULATION AND LABOUR FORCE.


NATURAL ATTRITION IN POPULATION - DEATHS
CONTINUING SYSTEM OF EDUCATION
PART TIME EDUCATION
ON - THE JOB TRAINING & RETRAINING
NATURAL INCREASE IN POPULATION — BIRTHS
PRIMARY AND LOWER SECONDARY (UNIVERSAL/ COMPULSORY ED)
UPPER SECONDARY HIGHER (NON - UNIV)
FORMAL SYSTEM OF EDUCATION
ACTIVE POPULATION LABOUR FORCE EMPLOYED UNEMPLOYED
INACTIVE POPULATION

STRATEGIES FOR CURRICULUM DEVELOPMENT IN THE U.K.

by

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INTRODUCTION

Science curriculum innovation is a complex operation involving many factors. For example, it may involve :—

1) Changing the syllabus

2) Changing the method of teaching

3) The production of new books

4) The production of new equipment

5) Changing examinations

6) Teacher re-training

7) Re-orientation of educational administrators.

None of these factors can be considered in isolation. All are inter-connected but changes could start to develop from several of the above points : for example, teachers themselves can sometimes bring about change, a change in the examination may do so, change could be organised by the Ministry and teachers instructed to implement them, a new textbook can affect change, and so on. However, all the above seven factors involved in curriculum innovation inevitably react on one another. Change cannot be brought about by one alone. For example, a teacher vacation course can inspire teachers with new ideas but these cannot be put into practice within the framework in which the teachers have to work i.e. with the existing syllabus, examination, books, etc.

How does Science Curriculum Development happen in the U.K.?

We can distinguish two strategies :—

1) A gradual, continuous, unplanned process largely carried out by the teachers themselves.

2) A cataclysmic, deliberate operation taking place within a time limit.

The Nuffield Science Teaching Project might be thought of in this second category. It could be regarded as a strategy planned by Generals, whereas the first process mentioned above is more reminiscent of Dad's Army.

Let us consider each in turn :—

1) The Strategy of Continuous Gradual Change

These changes are brought about mainly by teachers. How?

i) Through the Association for Science Education Committees on syllabus revision.

ii) Through writings in the School Science Review by teachers and university lecturers.

iii) Through the Inspectorate, which has issued occasional publications and organised teacher refresher courses.

iv) Through the Examination Boards, who invite teachers to serve on their subject syllabus committees.

In the past, there seems to have been a continuous stream of lively teachers who come forward with new ideas and are able to give a lead to the others, but there is the ever-present possibility that a time will come when no such leaders emerge. Without leadership, the teachers will tend towards conservatism, change may be exciting and inspiring but it also involves much hard work.

2) The Nuffield Science Teaching Project

As is well-known, this project was aimed at the reform of school science at primary and secondary levels. Although many groups of people were eventually involved, the initiative again came from the teachers. How?

To answer this question, we must look at the causes of dissatisfaction with the situation that existed. This dissatisfaction arose :—

i) From teachers, who found themselves teaching out-of-date, over-full syllabuses, and cramming children for examinations.

ii) From pupils, who objected to being crammed with facts, and found out-of-school science more interesting.

iii) From parents, who noticed that the natural interest of children in science was often destroyed by the school classes.

iv) From employers, who were suffering from the drift away from science among students.

v) From universities who were finding school science an unsuitable basis for further work.

To try to improve matters, the A.S.E. Committee met to modernise the syllabus reduce the factual content and provide teachers with notes to help them improve their teaching method, etc. These meetings took place in the teachers' spare time and it was soon realised that more time was needed if a good job was to be done. Patching up an old syllabus was not sufficient, it was necessary to produce new courses designed especially to achieve the aims of science education.

At this point, the Nuffield Foundation offered help. Experienced teachers were released from their schools to work, some full-time, some part-time, in curriculum reform. The Foundation provided money to pay the salaries of the teachers replacements, to provide officers and secretarial help and to enable the new courses to be tried out in schools.

The organisational set-up are as follows :—

i) In each project, a consultative committee was convened, consisting of a few teachers, university consultants and Inspectors, etc.

ii) Headquarters teams of about six were appointed, some full-time, some part-time in each subject.

iii) The help of groups of teachers spread over the country was enlisted for a variety of purposes, e.g. to try out lessons and experiments, to develop new apparatus, to write drafts of short readers, etc.

iv) The assistance of Examination Boards was sought and the Boards were kept in touch with the objectives of the project so that suitable questions and papers could be devised.

The general strategy was as follows :—

a) The aims of science education were discussed and enumerated in each subject and teaching level.

b) Outline course were suggested by the Headquarters teams.

c) These outlines were discussed with the teachers who were to try them out. These were often divided into groups of six under an Area Leader.

d) Trials of these materials were then started in about 100 schools. These trials were an essential part of the strategy. With a new course, as distinct from a modification of an existing course, it is essential that it be tried out in real school situations. Through the trials, feedback was obtained and was sought in three ways:

i) by getting the teachers to fill in forms

ii) by visiting the schools and watching the classes

iii) by occasional conferences between the trial school teachers.

The draft materials, pupils books, and teachers guides, were then re-written in the light of the feedback. Teachers guides may be largely unnecessary for experienced teachers, but most teachers asked for more and more detail to be given in the guides.

The Nuffield Project gave an impetus to curriculum development which extended well beyond those schools following the Nuffield courses. The teaching method used and the content are both affecting the so-called traditional courses and examinations, but we still have in the U.K. two kinds of school science and examinations and this may be thought to be a defect in the strategy.

So, we can say that neither the strategy of gradual, slow development or that of the special project is free from objection, so, we have now moved on to a third situation: the emergence of curriculum development centres. These are so far few in number, they are associated with a university and are responsible for teacher training as well as curriculum development. It is hoped that in this way, continuous leadership can be provided and that curriculum reform, teacher training, and research can all take place in the same building and that this will have beneficial results.

I have made no attempt to point out where our experience in the U.K. might be relevant to the situations in the countries of S.E. Asia. There will be lessons to be learnt both about what might be done and what should not be done, but one thing is certain — the lifting of a process from one environment into another is unlikely to be fruitful. Each country must work out its own strategies according to its own particular circumstances and needs. No new curriculum or method of teaching can succeed without understanding and cooperation from the teacher. The extent to which teachers are enable to handle new approaches will determine the extent to which the reforms are effective. So teacher involvement and teacher-training are of the first importance in any strategy of curriculum development.

WHY SHOULD WE TEACH SCIENCE TO CHILDREN?

by

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Why should we teach science to children? Because it is interesting and children enjoy it? Because science is more and more becoming a part of our culture? Because a knowledge of science is important for everyday living? Because science education is relevant to the economic and social goals of the country? These are some of the possible answers to the question.

But are these answers acceptable to a developing country where a large fraction of the national budget is already being spent on education, and where the education dollar or peso or baht or kip or..........is already being spread too thinly. Certainly a developing country cannot afford to add a subject to the curriculum simply because it is interesting and children enjoy it. There must be a better justification than that. Certainly science and technology are more and more becoming a part of the culture of every country. The majority of people in almost every country are affected to some extent by gas and diesel engines, by transistor radios and by other modern technological devices. But is this justification for teaching science to children in elementary school? And is a knowledge of science really important for everyday living? It is, to be sure, for the laboratory technician and others whose occupations are related to science and technology, but what about the bank clerk, the bar tender, the shop keeper, the newspaper reporter, or even the lawyer, banker or business executive? Perhaps science education **is** relevant to the economic and social goals of the country? But how can we be sure? And even it is, is it necessary that every child in school be taught science? Would not a small scientifically-trained cadre suffice for the country needs?

I think that one might make a logical case for the hypothesis that in a developing country it is not necessary that every child learn science; that only those who, as adults, will apply science in their occupations need to learn science in school; and that time in school, particularly in elementary school, is better spent learning useful things such as reading, writing and arithmetic, and engaging in practical activities such as woodworking, gardening, cooking and sewing.

But I reject that hypothesis. I believe that there is another reason for teaching science than those I have already mentioned. Science, if properly taught, can develop in the child habits and styles of thinking that are useful in attacking a wide variety of problems. In several countries, for example in the UK and the US, curriculum developers of new science and mathematics programmes consider developing habits and styles of thinking in children to be the major purpose of science education in the elementary schools, and, to a large extent, in the secondary schools as well. Let me quote from a few curriculum projects to illustrate the point that their major emphasis is on developing modes of thought.

From the United States program, Science Curriculum Improvement Study, comes this quote: " While the ordinary, everyday experiences of children apparently provide a sufficient experimental base for them to move from the level of intuitive operations to concrete operations, specially designed experiences are necessary for children to move into the level of formal thought. (Many adults have not had the opportunity to make this transition.) Units of the............program lead the children into suggesting hypotheses, deducing the logical consequences of these hypotheses, and designing simple experiments to test the predicted consequences."[1]

Robert Gagne, one of the developers of the elementary science programme, Science — A Process Approach, has said about that programme, "............ the aim is for every child to acquire the basic knowledge and point of view which provides him with a highly generalized method of gaining an understanding of himself and the world in which he lives."[2] And Robert Samples, the director of the Environmental Studies Project of the American Geological Institute puts it another way. He writes, " As students examine their environment closely, they first develop an awareness of its components. Next, repatterning takes place as they compare old or latent awarenesses with new ones. The final step in the intellectual involvement of the students with their environment............ is the invention of more abstract ways of explaining what they see and feel."[3]

These three quotations illustrate the thinking of the many scientists and teachers, who, over the past decade, have been developing new science curricula for elementary schools. The emphasis in these new programmes is on developing in children scientific modes of thought and not on memorizing a host of scientific facts. This is the major purpose, the major emphasis. But it is not the only emphasis. Some programmes‡ stress in addition the development in the child of an understanding of concepts of science. One ‡‡ pays particular attention to the development of the child's ability to observe, to measure, to classify, to make inferences, to control variables, to interpret data, and so on. All of these skills are important in scientific investigation whether by the child in school or by the scientist.

And science content is not neglected in the new programmes. Children learn to think and act scientifically by working with objects — with pendulums and rolling balls; with batteries and bulbs; with seeds and leaves and plants; with sand and soil and water; with simple household chemicals; and with many other things. The variety of science content that can be used in elementary schools is vast, so some selection must be made. Selection of content can be done in several ways. In the new elementary curricula about which I have been talking, selection of the science content has been made mainly by the writers who develop the science activities. The writers are scientists or science teachers who, for obvious reasons, develop science experiences for children on topics in which they (the writers) are particularly interested.

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‡ Science Curriculum Development Study (SCIS) and Conceptually Oriented Program in Elementary Program in Elementary Science (COPES).

‡‡ Science — A Process Approach.

But the selection of science content could just as well be done in other ways. If particular topics are considered to be important to the economic and cultural needs of a country, or to the future life of the child, those topics could be used to develop the desired scientific skills and attitudes in the child. In a country that is largely agricultural, the content of an elementary science programme might be related to agriculture. One of the participants in the elementary science education course that is presently being held at RECSAM has done just that. He has prepared teaching units on water and water conservation, on soil and soil conservation, and on the effect of fertilizer on the growth of plants.

To summarize what I have said up to this point, I am proposing that science **is** a subject that should be included in the elementary school curriculum of any country, whether developing or advanced; and I am proposing that the science that is taught should not be merely a collection of facts to be memorized. It seems to me that the purposes of science education in elementary school might be twofold; to develop scientific modes of thought in children, and to provide science experiences using science content that will be useful to them in later life.

If one accepts the proposition that science should be taught in school, and the purpose I have suggested, two questions must be answered next: What science should be taught? and How should it be taught? The answer to the first question must be made by each country. I have already suggested that in a country with a predominantly agricultural economy, topics related to agriculture could be included in the curriculum. Science can be taught in the school garden. Ecological relationships between plants and animals might be another useful topic to include in the elementary school science programme. Food and nutrition is another area worth considering in elementary school. But it is up to the responsible people in each country, and not to me, to decide what science content to include and what to exclude.

The second question, " How should science be taught? ", is the most important of the two. A short answer to the question might be : Children should learn science in the spirit of science. But what is the " spirit of science." Martin Schein calls it " the intellectual power of science ", and describes it as " the unchanging nature of science," as " scientific method based on logic," and as " the power of measurement and quantification " of " formulating hypotheses based on existing information and putting the hypotheses to test."[4] The scientists and educators who have developed the various new elementary school curriculum projects would all agree on one point — the elementary school child can learn science in the spirit of science **only if** he is actively engaged in investigating things — both animate and inanimate — and events; and **only if** in his investigations he is seeking answers to questions, preferably ones that he has asked himself. Not only his hands but also his mind must be active.

I have suggested that science can be taught in the school garden. I made this suggestion because during the past year I have been a number of lovely gardens in elementary schools in the SEAMEO region. And I have seen children tending those gardens. I am sure that they were learning a good deal about gardening — how to prepare the soil, how to plant, how to irrigate and how to weed and fertilize. But I am not sure that in every case that they were learning science. But they could. Martin Schein has said that one aspect of the intellectual power of science is " the power of measurement and quantification."[*] The school garden affords many opportunities for children to engage in measurement and quantification. They might measure the height of seedling plants as they grow and calculate the rate of growth. They might count the number of leaves on these plants and plot on a graph a curve showing the rate of appearance of the leaves. They might measure the size and weight of fruits or vegetables that are produced.

Another important scientific activity is the control of variables: that is, determining what effect a change in one variable has on a system in which all other variables are held constant. Children could develop skills in controlling variables in a school garden. They might investigate questions such as: What effect does the depth at which seeds are planted have on the growth of plants? What effect does the amount of water used for irrigation have on plant growth? What effects do different kinds of fertilizer have? Do plants grow as well in the shade as in the light? Does weeding the garden really improve the growth of plants? and so on. With a little effort, one might even bring into the garden different kinds of soil so that the children might compare plant growth on each kind. I am sure that you will be able to add many other activities that would help children learn science in the spirit of science in the school garden.

The secret of successful curriculum development is imagination and creative thinking by the curriculum developers. Those same qualities are also important in teachers for successful implementation of new science curricula in schools. In fact, if all teachers thought imaginatively and creatively about science experiences for children, and if they were given the freedom to innovate, curriculum development would probably be unnecessary. But, of course, not all teachers have these qualities. But a few do. Last year in an elementary school in Laos I met a teacher who had these qualities. Among a number of science activities I saw in her classroom was a biscuit tin in which silk-worms were being raised. The bright yellow cocoons could be seen through the glass window in the tin. That teacher knew the importance of developing the children's skills in making observations, and she was helping the children develop these skills by having them make frequent observations of the silkworms. I am sorry that I did not have long to talk with her, because I would have liked to have asked whether she was using the silk-worms to develop other scientific skills such as measuring and controlling variables, and scientific concepts such as " life cycles ".

The topic for this seminar is Strategies of Curriculum Development. Let me try to relate what I have been saying to this topic. The two questions I was discussing a few moments ago are certainly related to the strategies of curriculum development. Curriculum developers must decide at the outset what science is to be taught and how it is to be taught. I have suggested one way of deciding **what** science should be taught. It is **that science** which has a clear relationship to the economy of the country and to the future needs of the students. But curriculum developers may have other answers to the question "What science should be taught" The important thing is the question itself. One should not start a curriculum development programme blindly accepting topics already in the old syllabus as **the** topics for the new curriculum.

I have also suggested an answer to the second question: "How should science be taught?" Let me underscore my answer, because I think it is important. Science should be taught in such a way as to develop habits and modes of thinking — of thinking logically and analytically about the science topics the children are investigating. And most important, of developing the ability to generalize skills in investigating and thinking scientifically to new problems. Let me quote Robert Gagne again. He says that children who complete elementary school should be able to "...........apply a scientific mode of thought to a wide range of problems, including social ones, distinguishing facts from conjectures and inferences, and identifying the procedures required to obtain verification of hypothese and suggested solution."[2]

A third question curriculum developers need to ask is "What will happen to our new curriculum in the classroom?" This question is a critical one, for the most exciting new programme can be made prosaic and dull by unimaginative teachers. Training teachers to teach a new science curriculum is essential to success. It is probably more to the point to say that **converting** teachers to the philosophy of the new science programme is essential to its success in the classroom. Converting the teacher is, I believe, more important than developing the curriculum. How to go about converting the teacher I won't try to answer here. However, let me suggest that a first step to the solution of the problem might be to seek out teachers who already demonstrate imaginative ways of teaching and to use them as key teachers in training (or converting) other teachers.

One final thought before I close. I used as the title of this paper a question, "Why should we teach science to children?" I would now like to change the question to "Why should children learn science?" I want to change it to emphasize that in the new science education the emphasis has been shifted from teacher to the child. The action is no longer on the **teacher teaching,** it is on the **child learning.** And he is learning by doing.

And that brings me to the quotation I want to use to end this talk. You probably have all heard it before, because it is a popular proverb among those who are developing new science programmes for children in elementary schools. But perhaps you haven't heard it in quite this way —

Saya dengar dan saya lupa,
Saya lihat dan saya ingat,
Saya buat dan saya mengerti.

or in English —

I hear and I forget
I see and I remember
I do and I understand.

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NEEDS OF PROGRAMMED INSTRUCTION AND STRATEGIES FOR CURRICULUM DEVELOPMENT

by

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INTRODUCTION

Need of new ways to learn :

Scholars say, " If you are going to make a change, let there be a reason. " The rate at which man acquires knowledge doubled the first time about 1700, and again around 1900, the third doubling occured in 1950, and the fourth in 1960. 90% of the scientists that ever lived are alive today. The knowledge to be gathered is increasing at such an astounding pace that most educators are overwhelmed with stress. New ways of learning must be developed. Variable ways of grouping children in school must be attained. Scheduling of classes must be planned to meet the strength of all instructors. There must be changes not only in the organization of the school, but also in the school's facilities and in educating the community.

Schools, colleges and universities are major contributions to change in society, yet at the same time they must not remain rigidly set in their teaching ways, they must change themselves to mutual needs and requirements of the society that they serve.

Programmed instruction when used with other innovations, such as the continuous progress school, curricula redesign, instructional radio and television, learning laboratories, independent study systems, computer assisted instruction, and educational systems analysis, becomes an effective instrument in meeting tributions at all levels of education.

Within this perspective governments along with educational institutions should recognize in programmed learning an area which promises to make broad contributions at all levels of education.

What is Programmed Instruction?

By programmed instruction I mean the kind of learning experience in which a " programme " acts as tutor for the student, and leads him through a set of specified behaviours designed and sequenced to make it more probable that he will behave in a given desired way in the future, in other words, that he will learn what the programme is designed to teach him. Sometimes the programme is housed in a " teaching machine " (an audio visual device) or in a " programmed textbook ". If so, the machine or the book is little more than a case to hold the programme. The **programme** is the important thing about programmed instruction. The cost conscious educator should be aware that the research indicates no significant difference between students learning through an inexpensive programmed text and an expensive piece of hardware with limited programs and a high upkeep. The text format is the most common. The best judge of what type of programmed material to use would be an expert in programmed instruction, of course. An expert should decide as to which of the multimedia technological resources should be selected. The programme is usually a series of items, questions, or statements to most of which, the student is asked to make a response. His response may be to fill in a blank, to answer a question; to select one of a series of multiple-choice answers, to indicate agreement or disagreement, or to solve a problem and record the answer. As soon as he has responded to the item, he is given the correct response so that he can tell immediately whether his response has been the right one. But the items are so skillfully written and the steps between them are so small that the student practices mostly correct responses, rather than errors, and the sequence of items is skillfully arranged to take the student from responses he already knows, through new responses to the final responses and the new knowledge it is intended that he should command.

To sum up, then ,these are essential elements of programmed instruction : (a) an ordered sequence of stimulus items, (b) to most of which a student responds in some specified way, (c) his responses being reinforced by immediate knowledge of results, (d) so that he moves by small steps, (e) making few errors and practising mostly correct responses, (f) from what he knows, by a process of successively closer approximation, towards what he is supposed to learn from the programme. However, there are two characteristics of the making of programmes which are very important in the total effect. Firstly, before a programme can be designed, it is necessary to specify in behaviourial or operational terms the desired end products — the responses the student is supposed to be able to make when he has completed the program, i.e. the skills to be learned. Secondly, when a programme is being developed it is necessary to test and validate it.

In the programming technique, the student must respond if he wishes to proceed; by responding he will learn, whether or not he is conscious of the learning process taking place. Reading pages of conventional textbooks does not guarantee that the student is grasping the material. Often, he does not discover until examination time how fruitful his studying has been, and, if he has been making the same errors continuously, he may find he has only learned to do wrong things well. If he is being taught by the lecture method he may discover that the lecture is pitched above or below his level, with the result that he is confused or bored; his time may be better spent rereading the conventional text or sleeping in the back row.

Programmed instruction, a " revolutionary device " is simply stated, a method of teaching or learning. It is founded on psychological research to determine how people learn most effectively. It differs from conventional methods of teaching using standard textbooks, discussions and lectures, in that it programs or controls the learning process through which an individual must pass to acquire knowledge or skill.

Role of Programmed Learning

In areas where teacher competence is a problem, programmed texts can put a floor under the teacher's performance. Programmed learning is not a panacea for all the problems currently existing in education. It does however, alone and in concert with other techniques, provide answers to some of the questions in education and learning that have long been begging for remedies, such as learning in **crowded classrooms**, **individual differences,** inability to learn, shortage of **instructors** and **educational consequences** of **cultural deprivation.**

It is interesting to note moreover that although speed is not usually a primary goal of education, programmed learning reduces the costs of a given education and increases the amount of education possible in a given time, resulting in :—

i) less cost since less time is involved;

(ii) more education in same amount of time.

To resist change is a human characteristic, but change which offers great benefits must be explored (since all innovations are not good) and adopted if the benefits serve objectives such as national goals or aims such as those outlined by Dr. Eleanor Elequin, from the Philippines.

Programmes in reading, foreign languages, economics, maths, sciences even in chess and sail boating are available. Industrial fields, banking business industry, and the armed forces are making extensive use of Programmed Instruction.Adult educators are following their lead and are making new and vital contributions in the use of programmed instruction. In remedial reading for example programmed instruction is particularly productive for the **slow learner** (the underachiever).

Programmed instruction has been used by lawyers, doctors, scientists, high school and college graduates, as well as by illiterates seeking to learn, to read and write.

In the small or rural school, where the teacher may not be entirely prepared to handle all the material the curriculum should include, the use of programmed texts can effectively augment it and provide, for example, trade or college preparatory work.

The programmed text enables marginal subjects to be introduced with minimum cost and allows **curriculum expansion** (enrichment) where otherwise impossible. In some countries where the quality of rural education is low, this type of curriculum enrichment could be quite effectively implemented. Programmed instruction in such cases would not only elevate the quality of the instructional content but would also enhance the richness of the choices from which student could select. Administrators are facing both the problem of training teachers in new subject matter content and of teaching them new methods of teaching this content.

Limits of time make it impossible to attain these two ends satisfactorily in in-service training courses.

Programmed Instruction correspondence courses are appropriate in these two fields and would go a long way toward solving these problems.

Adult educators and teachers recognize that adult education is uniquely different from the education of children and youth. The adult learner brings to the school with him a background of life experiences that a child does not have. He comes from all walks of life and with all levels of education attainment. Most important is that he has a recognition of his own needs. When he enters the school house door, he has had to make some positive decisions about himself. Can he still learn, or is he too old, too out of touch? Is he doing something silly? Will his friends and family ridicule him? He feels a strong desire to fill the gaps in his education and he goes to the adult school for help. This is the crucial time for both the school and the student; for if the school disappoints him again he may be lost to the school and to society forever.

Many adult students have had unhappy experiences with education. A recent survey in Maryland shows that 53 percent of the dropouts were accounted for by two reasons: 1) Lack of interest and 2) Lack of success. A number of studies indicate that one half of the dropouts are students with better than average intelligence even on tests of questionable validity for the student concerned. The American school system runs for the benefit of the custodian, the cafeteria manager, the bus driver, the teacher, and the administrator, it has pushed him out because he failed to conform to the pattern or he has peruse, rejected the school and dropped out. When he returns to the adult school, he needs reassurance that he can learn and that he will not have to fit into the same pattern that he rejected in the first place. His shaky determination to try again must be reinforced. If he is given the same old material in the same old textbook, he will drop out again.

The adolescent and adult who drop out of school are not the only ones that can be helped by the strategic use of programmed materials. The college level young adult can benefit as well. Empirical evidence on the effectiveness of programming can be found in a study undertaken at the college level. In this study students were placed in three matched sections. One section studied solely from programmed materials, another solely from traditional texts, and the third was taught in the conventional fashion, lecture plus textbooks. The same test, a combination of objectives and easy questions, was given to each group at the same time. The results were clear. Students in the programming section scored significantly higher than the students in the other sections. In one experiment there was no significant difference between scores in the textbook only section and the lecture section; and in another experiment faint-hearted teachers will be happy to hear, scores in the lecture section were indeed higher than in the textbook only section. **(Micro-Economics : A Programmed Book** by Keith Lumsden et al. The study was conducted at Stanford University and the University of California at La Jolla.)

If the schools in your country want a broader based curriculum, continuous enrollment in adult classes, better attendance, fewer dropouts, less time required for learning, and increased capacity to handle more students, then, the government should introduce programmed instruction into the curriculum.

With programmed instruction the administrator of a school is able to broaden the scope of his curriculum by as many subjects as he wishes to offer in the school. Small schools are able to offer Statistics, Geometry, Algebra, Economics, German, French, Spanish, English as a second language, linguistics and so on, since there can be as many as 30 students studying ten different subjects individually.

In adult classes which use programmed instruction there is continuous enrollment. No adult needs to be turned away and told to come back " next semester. " When the adult is motivated and ready to learn, the school is able to help him. If he needs the class or subject now for vocational or personal reasons, he can get it.

A good programmed text and a good teacher make an unbeatable combination for maintaining enrollments and attracting new students and for keeping old students from dropping out.

Finally programmed instruction can increase the capacity of present school systems to handle more students. As the knowledge and population explosions continue, schools will have to use programmed instruction to teach more people.

In teaching more students, the student's needs, are the first area of concern. Thus programmed instruction can be used to satisfy **course requirements,** (a course or portion of a course taught using programmed instruction media); Programmed instruction can also be used to preclude **course deficiency** (using programmed instruction media to prevent course failure); for **improving course performance** (a program is used to raise a passing but low level of course achievement); for improving **noncourse performance** (a programme is used to improve previously learned behaviour not associated with any course); and finally programmed instruction can be used for **broadening the repertoire** (programmed instruction media are provided for the purpose of learning a new behaviour not previously known).

Recommendations

1st. My first recommendation, after a country has decided to initiate programmed instruction, is that the country should take advantage of expertise such as that offered by UNESCO. UNESCO has for the past two years offered Mobile teams of programmed instruction experts. These experts could help generate and foster interest among participants in their seminar.

2nd. Each programme is the product of a large team effort. Programmed language instruction for example is the product of scientific linguists, subject-matter specialists and programmers. As a result of this one of the major problems in introducing Programmed Instruction is initial cost. To develop the programme repertoire for just one grade may be very costly necessitating as it does the team approach just outlined. To design, buy and maintain necessary machines, audio-visual, audio-lingual or other multi-media equipment would cost even more. Where should this team be located? In the existing governmental and educational structural programme? Here are some suggestions :— The Philippines is organising an international committee for programmed instruction which includes members from :

i) Ministry of Education
ii) University Professors
iii) Television industry
iv) Textbook bureau.

These members of the various groups are assisted by programmed instruction experts as well as content experts.

Another suggestion : the organisation of the country's programmed instruction team should be composed of :

i) programmed instruction experts (they would assist in the selection of media to be used or which combination of media to be used in the programme in order to make it viable.)
ii) a bureau of publications.
iii) an Educational Television section.
iv) an audio-visual division
v) educational planning and research dvision in the Ministry of Education.
vi) competent professors from each of the educational institutions in the country.
vii) for vocational and technical needs, representatives from the Agricultural and Technical colleges in the country would be included.
viii) representative from the Science and Mathematics division of the country.

An important strategy in using programmed instruction in Southeast Asia must be that it be **problem orientated** and **learner centred.** This, programmed instruction experts could assure.

3rd. In whatever country a team is organised, technological engineering should be monitored by the objectives each team has in mind.

- i) These objectives should be defined by the various groups represented in the team but programmed experts should be at hand to deal with the priorities and problems concerned with their identification.
- ii) Analysis of the tasks to be taught must be done by both programmed instruction as well as content experts.
- iii) Programmed instruction experts must select the best media to reach these objectives.
- iv) Programme learning experts must perform a feasibility study suggesting alternatives.

As can be seen each programme is the product of a large team effort.

4th. The development of programmed learning media involve four basic functions :

programme selection
programme evaluation
programme production
and programme implementation.

The first question to answer about selection is a relatively simple one : Are there Programmed Instruction Materials already available that could meet the instructional requirements? If there are, the next task is to make a decision as to which programme should be examined for potential empirical evaluation. The programme selected must be thoroughly examined and tried out experimentally in the country where it is to be used before it is accepted for distribution on a larger scale. No programmed media materials are ever wholly acceptable in another country since the target population of both countries would necessarily be different.

Let's assume for the moment that a number of commercially developed programmes are available and can potentially meet the instructional problems as defined. The task now is to select one or more for empirical evaluation. Data is collected about the programme and the administrative considerations of the problem. Judgements are made concerning the subject-matter content of the programme, its level, time to complete presentation mode and so on. Commercially prepared materials are usually the best choice under the circumstances, but rarely an optimum choice. In Southeast Asia, the language in which the materials are presented would be a major consideration. If too many changes are necessary, in order to adapt the materials, one can decide to construct instead the precise programme one needs.

5th. Bearing in mind the problem of initial cost mentioned earlier the use of a country team as initial strategy to interest teachers experimenting with programmed instruction should select a subject, a school, a level, and a programmed instruction course, then, try it out taking care to note the results of terminal tests.

Crucial to the proper use of the country team of experts in the development of any instructional media in general, and programmed materials in particular, is the specification of an instructional requirement, need, or problem.

Each Programmed Instruction possibility is influenced by economic, management, and administrative parameters, as well as the more technical ones wedded to the method. The economic management and administrative factors should be solved by the Ministry of Education, that is at the governmental level, while the technical decisions of method should be left to the expert on Programmed Instruction of the country's team.

The country team is charged with maintaining an on-going and fully staffed project locating, classifying, and disseminating programmed media, materials, equipment, and information.

The team should keep an up-to-date listing of conferences, conventions, workshops, seminars and so on, involving programmed instruction and distribute it to appropriate levels. Subscribing to periodicals, purchasing books, and requesting papers and proceedings are also the responsibility of the country team. Government funds should be provided so that key non-administrative personnel can attend professional enrichment programmed instruction meetings.

CONCLUSION

1. A consistent policy, and the best one is usually the one which cost just a little bit more should be established.

2. Programmed Instruction is of such importance that it should not be left to individuals, the government should organise a team to identify a field — pick a level of school and provide the funds to implement a SMALL project on the one subject selected. For example, identify a primary school mathematics class level 3 then find money and people with a content expert, a Programmed Instruction expert and a 3rd grade school teacher and select Programmed Instruction Materials or develop them and try them out for say four months.

3. The team approach will give greater dividends than the one man approach. A project of more than four months is difficult, if less than four months, not enough.

4. If the budget of the country cannot support a permanent team then it should try to provide sufficient funds to cover one area per year for at least four months.

5. Some techniques of Programmed Instruction involve machines, other texts, other audio-lingual while others require audio-visual resources. The selection of the techniques for the presentation of Programmed Instruction depend on level of learner. Materials which can be applied in an international area should be **tested** and **proved** before made available generally throughout the schools of Japan and Singapore.

SEMINAR FOR SENIOR NATIONAL ADMINISTRATORS

March 1972

"AN OBSERVER'S VIEW FROM HONG KONG"

Mr. W. Fisher-Short
Asst. Director of Education,
Chief Inspector of Schools

I think I should begin by gently reminding delegates that I am here in the capacity of an observer. Curriculum Development is a reasonably new concept to us in Hong Kong; and, in fact, I have come here .and am most happy to have come, in order to learn from you. However, you have asked me to share with you some of modest experience, and I hope that the little I have to say will not be entirely devoid of interest.

I would like to begin by outlining the educational situation as it has developed in Hong Kong, at least in so far as it appears to prompt the need for, and to condition the progress of curriculum development.

Everyone here is aware of the vast increase in population which has taken place in Hong Kong during the post-war years. What is perhaps not so well known is that the population pyramid is such that from a total population of rather more than 4 million, more than ⅓, or about 1½ million are between the ages of 6 and 16, with ¾ of a million of these being of Primary School age.

Twenty years ago we were ill-equipped to deal with an educational poblem of this magnitude. We sought advice, and Norman Fisher came out from Manchester in the United Kingdom. As a result of his report we concentrated our initial effort on primary provision and I am happy to say that in 1972 we have achieved total provision of Primary places with an enrolment of about 765,000 pupils. This vast expansion has been achieved in the Government and Aided sectors of primary education, although the private sector accounts for about 20% of primary provision, in particular to provide places for a number of repeaters in the primary age groups and for a small number of over-age children.

Such expansion has brought with it many problems, not least some of a curricular nature. I should like to refer briefly to one or two of these now. Education in Hong Kong tended in the past to be something of a privilege which developed along relatively elitest lines. This still applies in some measure to secondary education, but more of that shortly. At primary level it meant that as development was embarked upon, continuity with past practices was a natural ingredient. This tendency to gear teaching to the academically superior and the socially advantaged was also re-inforced by, among other things, the popularly held view of why primary schools existed. They were, and still are by some, seen as preparation for secondary education, which did not increase in step with primary provision, and consequently assumed the status of a goal to be competed for. In the interests of social justice and of equality of opportunity Government introduced an examination to select, hopefully on a non-social basis, for the available Secondary places. It was conducted across all the examinable subjects taught, which at that time were Arithmetic, Chinese, English, Nature Study, Social Studies and Health Education. Backwash there certainly was, but it was spread across the total "academic" core of the curriculum. As development progressed, however, the number of candidates increased to an extent which made it virtually impossible to examine in so many subjects and with hand-marked extended written answers. The result was that the scope of the examination was restricted to Arithmetic, Chinese and English only, and machine marking of multiple choice scripts was adopted. All this as a result of the magnitude of the task we had undertaken. I think it is fairly clear why the three subjects, Arithmetic, Chinese and English have come to assume a disproportionately important position in the minds of primary teachers, of parents and of the children, and that both a goal for and a limitation set upon primary curriculum development is pointed.

Another limiting factor lies in the field of teacher training. It was necessary to launch a tremendous programme of teacher training to keep pace with increasing provision of primary places. Speed was essential and for some years, alongside the normal 2 year courses, one year courses for teachers of lower and mid-level primary were run. The one-year courses have been progressively eliminated in favour of full 2 year courses between 1964 and 1967 All our teachers have performed sterling service, but I think it is easy to understand that, in the context of modern 3 and 4 year courses of initial training, many of them will require maximal assistance to assimilate change. At the same time, the whole picture of teacher training may perhaps require review.

Students in our Training Colleges receive training which is almost exclusively subject based. By this I mean that they join schools equipped to teach one or two specific subjects, rather than to operate as class-teachers. This again, is not, I feel, lack of modern concepts of teacher-training in the minds of Training College lecturers. It is rather the direct result of force of circumstance.

The Colleges have been called upon to produce teachers for service in primary schools where instruction is organised on a separatist subject basis. This basis has come into being, partly as a result of traditional existing practice, but largely because of the content of our Primary courses.

The vast majority of primary education in Hong Kong is provided through the medium of Cantonese. The acquisition of the written language is both a specialised and time-consuming task for both teacher and taught. Approximately ⅓ of teaching time is devoted to the acquisition of written Chinese throughout most of primary years. The complexities involved in achieving command of a written version which does not directly correspond with spoken versions, call for sepcialised teaching and, as a result, for a corps of specialist teaching. Much the same can be said of teachers of English language.

We teach English language as a subject rather than use English as a medium of instruction at primary level, and as a natural consequence, a body of teachers is trained for English teaching and tend to become specialist teachers of English in the primary schools.

Subjects such as Music, Physical Education and Domestic Science tend naturally to fall to teachers with specialised training in these fields. When all this is added together, it is not difficult to understand how the primary curriculum has tended to become fragmented into disparate subject " pieces ".

Well, what emerges from such considerations as these. The most important fact, in my view, is that curriculum development must be realistically related to the total educational scene. One can apparently isolate separate problems as for example I have just drawn attention to the fact the primary curricula tend to be geared to the needs of the academically superior child, that the Primary teaching body is distributed among a variety of specialisms, that the secondary selection examination has a powerful " backwash " effect; it would, of course, have been possible to draw attention to many other factors which affect curricular change. Certainly one could quite easily preach a lay sermon about desirable curricular changes, reinforcing one's thoughts with ideas drawn from philosophy or educational psychology. The point is that such changes may not be undesirable but that they may not be practically possible within existing total social circumstance. Total social circumstance often seems like an indivisible web exerting a pull or a pressure in all its parts. One of its parts is the educational system and even within that system, what at first appear to be isolated problems are still bound within the total nexus. My second point would be, therefore, that curriculum development, if it is to be successful, must be seen not as a palliative or nostrum or even as an emergency operation, but as an integral part of social development, harmonised with social realities. Our attack on primary curricular problems in Hong Kong, as a consequence, must be both educational and social; as a rider one should add that is should not be socially disruptive nor socially unacceptable. Such a path is delicate to tread.

Returning to particulars. It is my belief that some of the more important limitations set upon primary curriculum development will assume a different aspect as universal primary education together with an increasing amount of post-primary provision to the higher levels begins to affect the attitudes of parents. Already, children enterin primary school have parents who have benefitted from the expansion programme. This process is cumulative. It causes the emergence of a different set of articulated parental desires for their children. Moreover, today's younger parents have shared in the prosperity of Hong Kong which makes educational expansion possible and has caused a great increase in real wages, particularly over the past ten years. In short, it is not the same social scene as it was twenty years ago. It is my belief that with increased secondary provision, the competitive element at primary levle will be ameliorated and this together with the emergence of more prosperous and informed parents will make it socially possible to introduce a more liberal primary curriculum. The timing must be socially " right ".

I would like now to turn to secondary education. Most of you will be aware that, having achieved total primary provision, the Hong Kong Government has now turned more particularly to increasing its support to secondary provision. Previous policy was to provide Government financed places for about 18% of primary leavers up to the level of Form V. Present policy is to provide such places for 18% — 20% of the primary 6 age group, a much increased figure. Additionally, by 1976 it is our intention to provide financed places for 50% of children in the 12 — 14 age bracket so that they may enjoy 3 years of secondary education, the percentage increasing to 100% by the end of this decade. A proportion of these places will be in new schools, some of which will be subsidized, in other cases there is being introduced a scheme to assist pupils to pay the fee in already existing schools. Policy is, then, for increasing provision, increased Government financial support, with a target of universal education at least to Form III. Natural development will, I think, tend to expend provision at upper secondary and tertiary levels as well.

Such increased Secondary provision will, as I have said, facilitate change at primary level. It will also create a challenging curricular situation at secondary level.

I do not want to go into detail about the existing secondary system. It is sufficient if I say it is predominantly of a "grammar" school type, dominated by a public examination system at the Form V level based on a European prototype, and geared to the production of pupils suited to pursue an academic or professional career. The expansion of such a system to the dimensions of universal "mass" education must involve curricular change. It is the quality of such change and methods of fostering it which is our major concern these days.

In the secondary area we are well aware of some of the more important social considerations, and of the difficulty there is in reconciling some of these with each other. We know that the majority of parents want the "best" for their children and the "best" means the University. We know that this is not possible for the majority of pupils. We are also aware that the social and economic development of Hong Kong is exerting pressure in quite identifiable directions. It must be realised that the Hong Kong economy may move from a basis of producing cheap consumables with a high relatively unskilled labour content, to one of producing durables with a smaller labour content of higher technical level and requiring a higher investment of capital equipment. Whether this happens quickly or slowly, it is also clear that a territory such as Hong Kong, whose main asset is the labour of its population, requires that labour to be capable of switching its operations at fairly short notice to adapt to international demand. Although the bulk of our population is young at present, the birth rate is slowing down, health is improving and the result will be a greater expectation of life with perhaps an increase of older persons in the succeeding decades. Real wages are increasing, disparities of income are decreasing; education for the intelligent and satisfying use of leisure is becoming important. Under the general impact of modernisation, the traditional patterns of family life and in particular sex roles are changing. All these things form the social nexus within which curricular change must take place, and no factor can be ignored. What then are some of the immediate targets for curriculum development? At primary level, in brief, the cultivation, at the socially correct time, of a more liberal, less competitive, less academic and more child-centred curriculum. At secondary level, the advance into the unknown; the provision, by the gradual development, of mass education, adapted in its parts to the needs of all levels of ability among pupils and to the requirements of a changing society; this provision to emerge from the at-present selective system of academically elitist quality. I suppose it is a job of what is sometimes called "social engineering", although I dislike the assumption that it is possible to have a pre-determined "blue print" for the end-product. Most frequently the quality of the product changes in unexpected ways as progress is made. Curriculum development is perhaps more of an on-going process with clear immediate objectives, but with no absolutely pre-determined long-term aims. Certainly in Hong Kong we shall progress with realistic and sensitive caution.

But progress we shall and already we have begun our preparations. The first consideration was to choose the "platform" or basic organisational structure on which curriculum development could rest and from which it could radiate. Hong Kong is a relatively laissez-faire economy and the same spirit permeates most departments of life. There can be no imposition of socially unacceptable measures. This applies equally to curriculum development, particularly in a context where the non-governmental agencies, both sided and private, have made such an outstanding contribution to education. We needed to find an acceptable, stable, non-authoritarian but organised basis for curriculum development. We think we have found this in the Advisory Inspectorate of the Education Department.

Using the Advisory Inspectorate as the already existing framework we have developed a hierarichic structure of working groups, called, for want of a better name, "committees"; although I would emphasise that the emphasis is on action and work rather than on talk. There are, in fact, two hierarchies ,one for Primary and one for Secondary Education, although shared membership ensures co-ordination.

At the base of each hierarchy are the individual subject working groups. These, however, do not work in isolation from each other but are under the supervision of co-ordinating c ommittees. For example, History, Georgraphy, Civics, Economic and Public Affairs, and Commercial Subjects, although they each have a subject committee led by an Advisory Inspector, form a curricular group or cluster which we have chosen to call the Modern Subjects, and the individual subjects are advised and correlated by the Modern Subjects Co-ordinating Committee led by a more senior Advisory Inspector. Similarly with the Sciences, the individual working groups for Physics, Chemistry, Biology, General Science, Health Education, Nature Study, Rural Science, and Mathematics work to the Scientific Studies Co-ordinating Committee, again led by a Senior

Advisory Inspector. An so on, for the other subjects taught. We have, for ease of working, reduced the curriculum to a limited number of major blocks. However, these do not work in isolation. All Secondary Co-ordinating Committees work to the Secondary Planning Committee and all Primary Co-ordinating Committees work to the Primary Planning Committee. We have created two full-time posts within the Advisory Inspectorate to accommodate the Charimen of the two Planning Committees. Finally, the two planning Committees will in future work to an august body, the Curriculum Development Council, the formation of which is now in hand.

Well, how is this working out in practice? As I said before the stable, ongoing basis for continuous action are the Advisory Inspectors working at the various levels of the hierarchy. The key to success, however, lies in the membership of the various working groups. Naturally, the Schools are represented in force, with teachers on Subject Committees in particular, Senior Teachers and Heads on the Co-ordinating Committees, representatives of Teachers Organisations and the various Educational Agencies more particularly at the Planning Committee and Council levels. This distribution of the grass-roots workers in the field is not iron-hard; there are, for example, Heads on Subject Committees and teachers on Planning Committees.

Also represented at various levels are the Teacher Trainers from the Colleges of Education, the two Universities, and the Technical Institute. The necessity for their intimate involvement is obvious.

Equally obvious is the necessary co-operation of the public examining bodies; the Secondary School Entrance Examination Committee, the Certificate of Education Board, and the Advanced Level Examination Board. Their representation is crucial for, although curriculum developers may make worthwhile moves they will not be effective, at least in the existing context, unless the public examinations reflect any curricular changes made.

Less immediately obvious to the " pure " educator, is the necessity to involve the educational administrators and in particular those who provide staff, money and facilities. We have included them, as we have also the representatives of our young, but very successful, Education Television Services.

Among the other representatives you will not, as yet, find either students or parents. I personally would like to see this and I feel that if development continues to be healthy it should be considered.

If we have got the representation right so that all pertinent social segments have a voice, we shall have created a unified body to deal in all its parts with the development of a unified socially relevant curriculum. The permanent structural element is the Advisory Inspectorate, but I must emphasise that in the working groups at any level, the Advisory Inspectors do not dominate. The elements of the curriculum must be devised, defined, tried out, evaluated and accepted by the representatives of the Schools, the Colleges and all the other agencies who are included.

Finally and as an example I will refer briefly to one aspect of the work of the Science Co-ordinating Committee and its attendant subject Committees. You will remember that I spoke of Government policy vis a vis Secondary provision. Our intention is to prodive, in the first instance, for 3 years of Secondary education with limited support, initially, at forms beyond this. It seems to us that not only must science during the first 3 years of Secondary education become less abstract and academic, but that it should allow for the greater practical participation of pupils, be more directly relevant to the life destiny of the majority, and be capable of enjoyable pursuit by pupils of all ability levels while, at the same time, providing a platform for higher, and perhaps more specialised, work; this to mention a mere few of the major considerations. We began by examining Nuffield Science and some Schools began work along Nuffield lines. After evaluation, and also I might add, after initial guidance by a specialist from the United Kingdom we decided against an unmodified "Nuffield". This decision was taken not by an individual but by workers spread widely across the educational field. Indeed, if individuals had been consulted it may have been that an "enthusiast" might have promoted what in fact would have been a decision unacceptable to the Schools in general. It was, I feel, a gratifying example of an informed, non-partisan decision freely adopted in an atmosphere of co-operation. It was generally felt that as a matter of majority relevance, the Nuffield approach was too great a step take from majority existing practice. This was not to condemn the approach as such. Indeed, a few schools have adopted it with success. For the majority of schools, however, it appeared to be too expensive. Expensive of equipment, expensive of time, expansive of space. It also appeared that the burden of preparatory teacher training was unrealistic. Moreover the approach, in the context of established methods of teaching and learning, demand a change of attitude too great to be assimilated by either teacher or pupil. However, all agreed that a greater measure of freedom, pupil participation and pupil exploration would be desirable. It appeared that a system more appropriate to our need was being developed in Malaysia and we were fortunate enough to obtain the services and advice of Mr. A. W. Jeffrey at the end of 1971 for a period of one month. Mr. Jeffrey has, I believe, been useful to Malaysia, and you will perhaps understand that this is an additional reason why I have been happy to have the opportunity for making this visit.

I have tried, rather sketchily, to tell you something about the Hong Kong Context for curriculum reform, something about the forces which prompt and limit curricular change, and something about our very recent attempt to create a basis for action within the Advisory Inspectorate through the Curriculum Development Council. I must apologise for any superficiality, but I was only informed that I might have to present a paper towards the end of last week but I thank you both for your patience and for affording me the opportunity to participate in your work.

A NEW STRATEGY OF CURRICULUM DEVELOPMENT FOR LAOS: THE "COMPREHENSIVE SCHOOL" PROJECT

by

Mr. Phouangphanh Sananikone

Laos

As part of its over-all attempt to develop a national educational system which has greater relevance to the needs and problems of Laos, the Royal Government of Laos decided in 1967 to experiment with a new approach to secondary education by building a "comprehensive high school" in the capital city of Vientianne. (The school is alternatively known as the "Fa Ngoum" school named after the famous Lao King who united the Kingdom in the 14th century).

This approach was new to Laos. New in the sense that up until then all the modern secondary school curricula were complete replica of the French high schools (the "Lycees") with French as the medium of instruction.

The new school is called "comprehensive school" because of the fact that its curriculum includes not only the usual academic subjects but also a program of elective practical arts courses in 4 general areas: namely, agriculture, commercial, home economics, and industrial arts. (see appendix on "Curriculum over view").

The new curriculum differs from the traditional in two major ways. (1) It uses the national Lao language as the language of instruction and thus represents one step closer in the attainment of the national goal of developing a **Lao** national educational system (as stipulated in the National Educational Reform Act, 1962). Secondly, it has by far greater practical orientation designed specifically for the needs and problems of Laos; it is said that this new approach trains "both the mind and the hand" so to speak. (All students take the same basic academic load of 22 class hours per week plus 13 hours of elective practical arts and other courses).

Another significant characteristic of this comprehensive school is the active involvement of students and parents in the development of the school program (which is unprecedented in Laos). There are experimental PTA (Parents and Teachers Association) and student government programs designed to provide a realistic example of democratic principles applied to the social system of Laos. It is envisioned that these programs will result in more relevant school programs, and graduates will not only become intelligent leaders but also responsible citizens, capable parents, conscientious workers etc. all of whom are necessary inputs to a successful national social and economic development program. In other words, this new curriculum accentuates the total education of the young and their participation in the fields of studies as well as the life at school and his social surroundings.

Progress and Problems

The adoptation of this uprecedented approach to secondary education has necessitated many new plans and action. For example, new facilities have to be constructed, new text books and instructional materials have to be developed, new teaching and administrative personels have to be trained etc. In carrying out of all of these operations, we have received capital grants from the U.S. Agency for International Development and the technical assistance of a team of educators from the University of Hawaii (under contract with USAID/LAOS).

In further support to the project, plans are being made to set up a National Curriculum Center, this will be part of the National Linguistic Institute.

Teachers for the project schools are all Lao nationals except for foreign language teachers. The critical shortage of experienced trained Lao teachers has necessitated emphasis on short-range in-service training programs, and long-range participant training programs to supply the ever-increasing needs as the project expands each year. There are currently four comprehensive schools located throughout Laos. With limited financial resource at its disposal, the rate of expansion of this project will continue to be a function of the availability of foreign technical and financial assistance.

Conclusions :

Laos still has a long way to go towards meeting the needs and aspirations of its people in the field of education, but this comprehensive school system has opened up new and most important avenues in the approach towards new teaching methods. With curricula adapted to regional needs and designed to bring about more efficient use of limited resources.

In closing, the delegation of Laos would like to express its renewed faith in, and endorsement of, the spirit of regional cooperation which has brought us here together on this occasion. It is our hope that when we all leave here at the end of this seminar, we will leave feeling that we all have learned something worthwhile from each other's problems as well as accomplishments.

APPENDIX

Curriculum Overview of Fa Ngum schools

(Note: figures represent hours per week for each subject)

Subject \ Grade level	7th	8th	9th	10th	11th	12th	13th
Lao Language Arts	4	4	4	4	4	4	4
Lao Social Studies	4	4	4	4	4	4	4
Science	4	4	4	4	4	4	4
Mathematics	4	4	4	4	4	4	4
Foreign Language*	8	6	6	6	6	6	6
Physical Education	2	2	2	2	2	2	2
Practical Arts**	6	8	8	8	8	8	8
Guidance & Fine Arts	2	2	2	2	2	2	2
Student Government, clubs	1	1	1	1	1	1	1
Total	35	35	35	35	35	35	35

* Students take 4 hours per week of French and 4 hours per week of English during grade 7. They then elect 6 hours per week of French or English for grades 8 — 13.

** Practical Arts divisions are Agriculture, Commercial, Home Economics and Industrial Arts.

ATTEMPTS IN THE FIELD OF REVIEWING CURRICULUM

by

Mr. Khieu Komar

(Khmer Republic)

Nowadays, our teachers at all levels, and the public in general, realize the necessity of reviewing the curriculum for our elementary and secondary education. The following questions need to be answered :

1) How to fix the content of new curriculum?

2) How to formulate these curriculum?

3) How to apply them?

An attempt has been made in this connection; but some mistakes make us careful not to fall in the same errors again. This report points out some aspects of the problems which have not been efficiently solved. We will feel more strongly, afterwards, the needs for learning new techniques for curriculum development.

I — PRIMARY EDUCATION

The curriculum actually used in our primary schools dates from 1958. After using it for 15 years, the teachers themselves showed their dissatisfaction with its contents :

— Too many things and not always interesting, are taught to children.

— The same subject matter is taught in different lessons in the same class, e.g. the weather and the atmospheric phenomenon are taught in Applied Sciences and also in Geography.

— Progression is difficult when one subject matter is taught in different grades, e.g. the Study of flowers takes place in the 9th, 8th and 7th grades.

What is teachers' interpretation of curriculum based upon? Perhaps on official instructions, books allowed to be used, teachers magazines.

Official instructions include the aims and objectives and teaching directions which can be seen at the beginning of the syllabus of each subject matter. Very often these instructions are written in general terms, which makes the understanding and the application difficult to the teacher.

As for books which strictly follow the curriculum, very few have been edited by the authorities concerned : 2 books of mathematics and 2 reading books for the first 2 years of Primary Education. The rest belongs to private writiers whose books can be used in schools only after they have been granted authorization from a special official committee. Another official committee in charge of writings for primary schools, has tried to set up a working method to correctly interprete curriculum (limits of content for each class, progression in time, division into chapters, inquiries of the environment on the spot, method and approach etc............). Most of its works remain simple manuscripts for want of financial support for publication. As for teachers books, they do not exist at all. That is why the poor teacher manages his work by his own self, recommending to his pupils different kinds of books. The result of it is a complete lack of unity in the interpretation and sometimes a false interpretation of the programme. It would perhaps be useful that those who write school books be the same as those who have set up the curriculum.

Only one primary teacher's review named " Revue de l'Instituteur Khmer " is distributed free of charge each month to all teachers. $\frac{1}{3}$ of its content (about 20 pages) deals with lessons relative to certain parts of the programme. It is probable that the teacher finds nothing in it which has any connection with the programme of his class through the whole year. Those teachers who work in rural areas would leave certain parts rather than teach in a bad way, for they dispose of few information and little time.

In support of methods recommended by the programme, attention has been given to the use of teaching materials. One section of the " Service Pedagogique " devoted itself to researches into the making of prototypes of materials with cardboard, wood plaster, pasteboard, clay................ During refresher courses, participants are shown these materials, but that is about all. How can they use these aids in their classrooms when the prototypes lay still on the shelves for years and years? Would someone suggest to leave them to the care of teachers of Application Schools : they would have a try at them and would send them back to the producer with their criticism and suggestions. Once the prototypes have been improved and recognised to be really efficient teaching aids, what is left to be done is to give the draft of making to teachers who are willing to make by themselves simple models. Financial aids can be supplied to create standardized production of complicated and costly models. These are only ideas : it has to be an organizing mind to put these ideas into practice.

Another aspect is the teachers training with a view of an adequate application of the curriculum. This has not been our main concern,for our programme has been put into use before our teachers have been trained. 20,000 of them who were to use this programme had no precise idea of the changes introduced in the content or of the appropriate methods required by the programme itself. To solve this problem " inservice training " for many years with the help of qualified teams must be planned: No official circulars with instructions are worth these trainings. Later, when refresher courses were organised for our school directors, importance was only given to school administration, while interpretation, application guiding, and evaluation of programme were unfortunately neglected. In our "Teachers Training Centre", the students learn general teaching, methodology of different subject matters, but they are not initiated in making most of the present curriculum. So that after leaving the Centre, when they have to face their classes with their programmes, they do not know how to establish progression, monthly or weekly repartition in details, or to adopt an appropriate method which corresponds with the spirit of the programme. Here lays a ditch between the learning of the teaching theories and the practical use of curriculum.

Briefly speaking, in our opinion, the question is :—

— What must administrators know in the field of supports for putting the programme into practice?

— What must inspectors know in the field of interpretation, guiding and evaluation of curriculum?

— What must teachers know in the field of application of programme in the frame of their classes? How must they be trained technically so as they can have a general view of the programme?

— To what extent and in what shape must teacher be guided by official instructions? To what extent freedom can be accorded to him in his personal initiatives?

— In "Teachers Training Centre" is there any advantage to comment for teacher-students on the programme in use and to illustrate its eventual use. Or is it not worthwhile since programmes change and basic methods alone don't.

II — SECONDARY EDUCATION

The curriculum at secondary level was reviewed in 1967 and became a "A, B, C Programme". Here are the main characteristics of this programme.

THE AIM. General Education given during 7 years in secondary schools can only produce semi-intellectuals who are not fit for future training. It needs to be diversified from a certain level, with an orientation during the course of studies.

THE STRUCTURE. Two years of common trunk during which students learn the same things and are observed by their teachers to test their interests, their natural disposition and the result of their works.

Four years in one of the 3 sections A, B, C, after an orientation recommended by the Council of Teachers.

Total years of studies : 6.

THE CONTENT.

Section A : Concerns literature and Humanities studies. The number of hours has increased for the studies of languages, Literature, Philosophy, History and Geography.

Section B : Deals with Physics and Maths. The number of study-hours has increased in Maths, Physics, Technical Sciences.

Section C : Deals with Chemistry and Biology. The number of study-hours has increased in Biology, Chemistry and Geology.

This diversification does not mean a division with a tight partition. Pupils who have been wrongly oriented into one section can transfer to another section, at least in the beginning years. It was wished that this education always kept its characteristics of general education.

Two changes in the reform were **diversification with a view to orientation,** and the introduction of a new field : **Practical activities.** We wanted the students to use more frequently of their hands by handling different tools to make useful things according to their taste. At the same time, they learn technical steps in conception. They can choose between shops (electricity, woodworking, mechanics and steel-working)), agriculture and home economics (for girls).

People concerned with Secondary Education had estimated up to 200 million Riels the cost of setting up the teaching of Practical Activities. The Government had promised 50 million to launch the project, but had been able to grant only 9.5 million of the Five Year Plan Credit, for equipment. UNICEF had brought a supply of :

— 134,502.58 US$ for tools and other materials.
— 6,886,225 Riels for training and refresher courses (363 monitors and 346 teachers).
— 14,859.70 Deutch Marks in transportation.

Aids have also been supplied by UNICEF to Primary Education in the same field. Parents Associations had built 110 shops for woodworking, 54 for mechanics, 47 steelworking, 31 for electricity working and 90 for home economics. 117 lands for culture had been bought and joined to the existing schools, sometimes with stables and hen-roosts.

In late 1969, despite difficulties in providing raw materials, these shops began to produce teaching materials, different things and crops for sale or for students' use. However, the people concerned do not agree on the real objectives and the content of this education. Teachers do not see the scope or the methods, for they have to associate technological skill with teaching skill. Most of them work like bureaucrats. Since March 1970, the war has caused great damages to our school buildings, putting shops out of use. For the moment, the teaching of Practical Activities has to be dropped. Equipment already delivered are stored in some place. This is an unsuccessful innovation. If we are to review our curriculum for secondary Education we will have to keep these facts in mind.

The other innovation, **the students' orientation,** was favorably welcomed at the beginning. An observation method was elaborated, and with expert's help simple tests were prepared (test on perception and mechanical sense) for teachers' uses Initiation conferences were organised. But this is the work of a psychologist and of a pedagogue which cannot be learnt at just one or two conferences or training courses. The first results on orientation raise doubts: are tests correctly done? Do parents agree with them? Supposing that they are correct, would not orientation be premature for youngsters of 14 years who have been observed for only 2 years? Supposing that they are approved by parents, is the Government not responsible in finding jobs for those recently oriented?

In the present situation, our specialized services cannot yet have an exact planning of our future needs in personnel for different sectors. Here again, the people concerned with Education have had to stop pursuing the project, go back to the starting point, and then think the problem over in the proper perspective.

So the present curriculum of our Secondary Education is only a temporary one which has been somewhat improved to meet circumstances. As before, it will have a common trunk of six years, but imposes an option at the end of the 7th and last year of studies.

The question of reviewing curriculum of our Primary and Secondary Education is pressing and we cannot wait until the war ends to start off. We must put a stop to the decline in study level. Of the disappointments we had suffered, we can draw out the following lessons:

- The content of our curriculum was undoubtedly too ambitious, considering the small local possibilities;
- The objectives and the content were not clearly defined and formulated in details;
- The application was premature without any experiment or evaluation, or previous preparation of conditions for application (books, materials, refresher courses for personnel)
- The people concerned do not appreciate the techniques of elaborating school curriculum, and of implementing it;
- The qualities of a good "manager" are not sufficient, the Government must understand the problem and gives its whole support, mostly financial.

Needless to point out that the activities of RECSAM in the field courses, retraining and seminars relative to the problem of school curriculum, are very useful to us. The Khmer Republic will collaborate fully, hoping to benefit from the experiences of other SEAMEO member countries.

THE CONDITIONS OF THE INFRASTRUCTURE OF EDUCATION AS LIMITING FACTORS IN THE SELECTION OF ALTERNATIVE STRATEGIES IN CURRICULUM DEVELOPMENT

by

Mr. Setijadi (Indonesia)

1. Introduction

First of all I would like to ask the permission of the Chairman to speak bluntly, to exaggerate sometimes, and more or less go to extremities. I consider this necessary to get my points clear.

Second, I would like to put myself as an Educational Administrator. This is like saying that I am a dumb person. But, as a TV show I saw last night[*] said, dumb is beautiful. Why? Because it is the smart people who are making wars, creating tensions, producing pollutions and creating campus unrest. Then, a suggestion was made that the dumb people are at least responsible for creating the population explosion problem. Certainly not, was the answer, because the dumb people cannot count.

Well, I am not that dumb that I cannot count. As an Administrator, I can count the money I have for education, I can also count the teachers that has to be re-trained to make curriculum change possible. But beyond that I would like to request the assistance of people like Prof. Lee, Dr. Fatimah and Dr. Eleanor Elequin. In this seminar, I would like to act as the dumb administrator and would like to see RECSAM and its consultants to be the smart technocrats, not to create more chaos, but to help us to solve our problems.

2. Educational problems in developing countries may be vastly different from one country to another.

The differences are mostly caused by other than educational. I prefer to call it the infrastructure of education. The infrastructure of education are general conditions which have a great impact in the courses of events within education.

There is, for instance, the problem of the National Language, which the delegate from Laos has indicated. I can still see that this problem is a major problem in the Philippines and to a lesser degree this language problem is also faced by Malaysia. But Indonesia and Thailand have no such problems.

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[*] The Dean Martin Show

Another example is the relationship between RECSAM and the member countries. Mr. Chin Pin Seng indicated in his presentation, that up to 1975 there will be a total of 1150 key personnel trained at RECSAM, which means that on an equal basis, each country will get about 143 trained key personnel. This number may mean a lot for Singapore, however, it will be almost nothing for Indonesia who has about 300,000 school teachers at the primary level alone.

3. Some conditions of the infrastructure of education in Indonesia

Since the time for presentation is limited, I will only mention three conditions of the educational infrastructure.

Condition I : **Low teachers' salaries.** If you have very low salaries, you can expect many things to happen which could impede the implementation of curriculum change. To be sure, teachers' salaries are not lower than other government officials, but compared with salaries in the private sector, especially with salaries of foreign companies, they are very low and not adequate to carry on with the family without supplementary income.

This need for supplementary income is making it necessary for teachers to have multiple jobs, if their wives, or the parents, could not provide the necessary supplements. The government is making a serious effort to increase salaries of the civil servants including teachers, however since the number of them are very large and the resources limited it will be several more years before they receive adequate salaries.

As a result of the low salaries, the teachers training schools and institutes are the last choice of students and if it is possible for graduates of those schools and institutes to have other more paying jobs they tend to leave the teaching profession they may go to Malaysia where the opportunity is open.

When I hear Mr. Chin Pin Seng pleading for improvement in Teacher education in his paper : "A second look at Teacher Education", it occurred to me that perhaps what we need in Indonesia is to have just a look, a very sharp look, because I have the feeling that what Mr. Chin Pin Seng is presenting is somehow not answering the priority problems that an administrator of teacher education is faced with in Indonesia.

Condition II : **The large size of the country and its population and the high degree of provincial variations.** Here again you have an infrastructure that made it impossible to talk about Singapore (or even Malaysia) and Indonesia as belonging to the "developing countries", having similar problems. The country variations in this respect will determine the strategy to be adopted. For instance, the strategy of managing reform from the centre may be an impossibility in Indonesia. There may be a need to have different strategies for different provinces, so that we cannot even regard Indonesia as one entity in this regard.

It is not so easy to conduct teacher in-service programs because of the great numbers of teachers. Unless we can find ways to do this through radio broadcasting or through 'teacher proof' programmed tests, as Dr. Kulkarni told us were successful in India, we cannot hope to reach the masses of teachers without a vast effort of teacher in-service program, any curriculum reform is bound to be very slow.

However, strange as it may seem, Indonesia does not have problems of overcrowded classes in the higher grades of primary schools because of the large percentage of drop outs. If ways to consolidate schools could be formed many teachers of those higher grades could be released to help easing the overcrowded classes in the lower grades. This situation seems to be unique among S.E. Asian countries. How this will affect the choice of a strategy for curriculum development I do not know, but the question of how to teach very large classes seems not too relevant for Indonesia, at least not for the time being.

Condition III : **The variations in the difficulty of physical communication.** In Ambor, a school supervisor may not be able to visit some of his schools for one year or more because these schools are scattered in many islands and is only accessible during certain periods of the year when it is relatively safe to reach them by boat. The school supervisor in Djakarta will not have too much difficulty in reaching his schools daily if need be. The two provinces will obviously select a different strategy for implementing curriculum reform.

Condition IV : **The dependence of educational administration to the general government administration and the rigidity of this administration.** Promotions could only be made after a teacher served at least four years at the present position. Young, bright teachers could not be quickly promoted therefore most of the inspectors and headmasters were promoted to their positions because of seniority rather than ability. There are other administrative constraints, causing this situation, but I won't deal with it in this presentation. The most important thing is that education has to live with it and that the strategy to be selected should take into account this condition. It will be difficult, for instance, to make school inspectors the pioneers of curriculum reform, although there may not be any other way.

There are a number of other conditions in the educational infrastructure that has a great influence in curriculum development. I hope that RECSAM will act in the spirit of what Mr. Everest has put forward in the last section of his presentation; the willingness to see the realities of the infrastructure and ask more relevant questions, because we cannot wait until everything is in order.

4. The search for a panacea

Mr. Lam Kok Hon have said that the systems approach should not be regarded as a panacea. No one in his right mind professes to search for a panacea, however the practice is usually the opposite. I believe that many of us are looking for a panacea, although the panacea may not be a single strategy but a combination of strategies. It is not like an aspirin but more like a bodrex, which claims to be a combination of several layers of different medicines.

In Indonesia the economists and other technocrats seemed to find the panacea for economic recovery — Let us look more closely at what they have done. We, in education, might learn a lesson from them. Simply said, what the government and the technocrats are doing are manipulating the economic forces. The government is not doing many things themselves. It is only releasing latent forces in the economy by making initiative easier and more profitable.

Are there equivalents of economic or market forces in education? Obviously there are. These forces have been released by the spirit of independence of our nations. However, so far the forces were only utilised to convert elitist education into populist education. That is, these forces were causing the vast expansion of the school population in a relatively short period. But today our problem is different. Our most important problem now is to make education more relevant to the needs of economic, social and individual development. The problem now is usually how to raise quality cheaply. This is calling for a strategy which on the one hand will make it easier and more profitable for supervisors, headmasters and teachers to introduce innovations; and on the other hand will encourage the community, the local government and the parents to put all the resources available to help these teachers. This calls for other than centralised leadership.

All of this is obviously not directly the concern of RECSAM. The government is taking serious steps to correct the imbalances of the educational infrastructure. But the country's priorities are many and there is not much money. These imbalances will obviously remain for quite some time. In the meantime what shall we do?

5. The role of RECSAM

I am not proposing RECSAM to help Indonesia to deal with improvement of the educational infrastructure. What I do want is for RECSAM to be aware of the different conditions of infrastructure in the member countries, and to interpret what it means for science and mathematics curriculum development, for the in-service and pre-service training of the teachers, for the kind of instructional materials and teachers' manuals to be developed, and so on.

We are soliciting assistance from everywhere and we have with us some of the best educational consultants in the world, and it still remains with us, Indonesians, to do the big job of improvements ourselves. We are searching for an application of the systems approved to education with UNESCO-UNDP-American Institute for Research and Rand Corporation. We do have a Ford Foundation sponsored National Assessment of Education. We have big names in our list of consultants, such as C. E. Beeby, Ralph Tyler, John Flanagar, Frank Womer and others. We are prepared to do any innovation that will help us. Way back in 1954, we have started with development of Science Teaching Centres, working on similar things as you now do at RECSAM, the results of this overture were not too encouraging. These centers are now dying. The educational leaderships of Indonesia is of the swift type, as described by Mr. Everest. Soon, Indonesia will also embark in a venture similar to that in Scotland : we will make Indonesia a very large pilot area, experimenting with Development Schools. What the outcome of all these activities will be is too soon to assess. Naturally, we hope to succeed in making education more relevant to the need of the country and its people.

Can RECSAM help us more than just training tiny drops of key teachers, and proposing courses of actions which we have attempted to do almost 20 years ago? Maybe I am asking the impossible, considering the limited staff and funds available at RECSAM. But I am still hoepful that RECSAM can do something more. Over to you, RECSAM.

STRATEGIES FOR CURRICULUM DEVELOPMENT IN VIETNAM

by

Mr. Pham Tan Kiet
Mr. Pham Van Quang
(Vietnam)

FACTS

1. Vietnam does not have much local influence from various interest groups in the community to contribute to curriculum development. Much is being done at the central level.

2. The Vietnamese authorities however are preparing for :—

    1) Accurate analyses of social needs and the changing requirements of society.

    2) The cooperation of local influence and interest groups and the ultimate coordination of councils and committees from various levels : Teachers own planning, school unit level, system level and external level.

3. Educational objectives are not yet finalised. Educational policies are being prepared by the Cultural and Educational Council.

4. Lacking in facilities and personnel, Vietnam is putting first priority to quantity. Thus, the process of curriculum change must be slow. Social change and the influx of students make the problem more complex.

5. Lacking in means to incorporate the efforts of all levels concerned for curriculum change in terms of projects, personnel and experimentation. Teachers' Salary is low. Examination systems has not been changed.

6. Vietnam is a society of much change in economic growth whereas there are many values to be preserved.

7. Lack of translation into Vietnamese of Mathematics and Science Terminology, although all subjects have been taught in Vietnamese.

STRATEGIES

1. In the meantime, we have to maintain several classical aspects of curriculum. Due to the situation, in the past decade, the curriculum is revised in some aspects according to the special situation of each year. In the

past academic years 1970 - 71 and 1971 - 72, the curriculum is made up-to-date, but efforts are made for the reorganization of the contents of subjects or some new concepts of science and mathematics added.

2. In the near future, we need the work of central personnel concerned to broaden the scope of the curriculum according to the objectives clearl delineated and to have feedback from various centers for experimentati n, before radical change can take place for the whole nation.

A. **Central Level**

1) Professional commissions to bring about recommendations and basic guidelines for the curriculum and plans of action for the development and implementation of the curriculum; in Vietnam the Cultural and Educational Council including educational leaders is at work for this purpose.

2) The various Faculties of Pedagogies to put the new curricula into experiment in their respective demonstration schools. In Vietnam, the Thu-Duc Demonstration attached to the Faculty of Pedagogy Saigon is experimenting a comprehensive programme which is revised each year. Out of this, the Directorate of Secondary Education with the help of some professional advisors are compiling a new set of comprehensive curriculum for 11 more pilot schools. The comprehensive curriculum adds some new aspects : home economics, industrial arts, business education and agriculture, and revises the out-of-date elements. The Faculty of Pedagogy Saigon has opened programmes to train teachers in the practical arts and to train guidance counsellors as well.

3) Parallel with the work of preparing the curriculum for the comprehensive schools, the National Curriculum Commission, having the long-term task, is revising the curriculum of the regular classical high schools.

4) The next step will be the establishment of inter-university commissions on Secondary curriculum. It is possible that each Faculty of Pedagogy will work on a particular aspect of the curriculum once the overall scope has been determined.

B. **Local Level**

We need the understanding and cooperation of teachers, students, parents and interest groups of the community. Thus efforts are being mobilized for :

1) Mass communication on the needs of society to mediate the conflicts of progressive and conservative elements. This task should be worked out by the Ministry of Education and educational leaders of the nation.

2) The promotion of democratic working patterns among various groups and members.

3) The establishment of school-community council, student council, staff council and executive council. (However, this task is carefully planned to avoid negative results and the involvement of activities other than educational).

4) The attitudes and efforts of individual teachers to be responsible for curriculum revision rather than teaching a ready-made course content.

All these efforts are being prepared especially in terms of professional personnel. The graduate and doctoral programmes recently opened at the Faculties of Pedagogy in Saigon and Hue as well as the in-service training programs for teachers can be the foundation of change.

3. CONCRETE TASKS

1) The curriculum should be :

   a. practical and suitable to the life patterns of Vietnam
   b. for mass education, not for a minority of elite alone.

2) The curriculum change should be a slow process for 4 years. (1972-1975) which can go along with the development of educational objectives in our country. During this time, we need to train personnel and to establish research centers to keep up with the change of social requirements.

3) To set up educational regions and to adapt our national education to the needs of each region in our country. In order to achieve this purpose, the curriculum should have two parts

   — the core applied for all students of the nation
   — the special part answering to the needs of each region which can be decided by the regional leaders of education.

4) To set up in-service training centers. In each of the educational regions, the Ministry of Education will set up an in-service

training center. RECSAM participants can serve in these in-service training centers.

5) Science and Mathematics curricula. Elementary school curriculum will be revised in 1973 after 60,000 elementary teachers have been trained to use the new methods. Now, they are still teaching the community school curriculum. For secondary schools, modern mathematics have been taught at grades 6, 7, 8, 9 and since 1971, and new concepts of science have been introduced to grades 11 and 12 since 1970.

CONCLUSION

1)) Facing with difficulties of the situation of a country under war and the lack of personnel, Vietnam presently has to follow a slow process of curriculum change through the implementation of some new aspects as well as modernise some aspects in each subject. This task is being done each year. Experimentation projects also meet the difficulties due to the above mentioned reasons.

2) Vietnam is in the period of **preparation** for necessary elements concerned. The prospect of a real curriculum change emphazize the role of the coordination of the Ministry of Education, the role of the various Faculties for personnel and the role of various agencies — international — backing research and experimentation projects. RECSAM can play a major role in curriculum development in Vietnam especially in terms of training professional personnel.

NEED FOR CURRICULUM IMPROVEMENT

by

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(Thailand)

The present curriculum was put into effect in 1961 after the National Scheme of Education was proclaimed in 1960. In recent years, there have been needs for curriculum change in Thailand in order to have a more dynamic and motivative one. These needs have been suggested through seminars, researches, articles and opinions from many educators. There are some major issues challenging the need for curriculum improvement.

First. **Lack of relevance of curriculum to existing social and economic conditions.**

The present National Scheme of Education put particular stress upon meeting the needs of the individual and national expectations. It also is assigned to serve the public in every region of the country and from all social and economic conditions. There are many weaknesses in the present curriculum in serving these objectives. For example, the bedrock of the economy is the agricultural sector (about 82% of the population is engaged in agriculture), and the vast majority of the total school population becomes farmers or are employed in some phase agriculture. Despite this, the relationship between the curriculum and the economy is indirect and not so very apparent.[1]

A study of the primary school curricula conducted by the Bangkok Institute of Child Study in 1963 could be described by the following passage.[2]

" It is clear from our results that for some subjects and some region, the expectation of the curriculum maker were unrealistic and that too much was expected of children without taking into account the school, social, and family conditions."

Second. **Need for the development of manpower.**

It has been realized that as economic and social development proceeds, modern societies require personnel with various levels of knowledge and with increasingly specialized types of skill and aptitude. The Second Five-year Economic and Social Development Plan (1967 - 71) focused attention on the importance of urgency of manpower development and includes among its principal objectives employment promotion and development of human resources. Major attention for this purpose was on secondary education.

Strategies for initiating curriculum changes in secondary education started from " Preliminary Assessment " emphasizing the relationship between education and manpower in Thailand. With the recommendation of the "Preliminary Assessment" various sub-committees worked on the secondary education study and the report was finalized under the responsibility of the Executive Committee.

Manpower analysis and enrolment projections in Thailand treated by the experts were also recognized by the secondary study group. All the recommendations made by the secondary study group are elaborated on, analyzed and justified in the final report. It emphasized a comprehensive type of high school with the recommendations of curricular structure implementation and staff training.[3]

At present this kind of curriculum is being tried experimentally in 20 comprehensive secondary schools.

Third. **Need for the promotion of Science Technology in Education.**

It has been realized that education should catch up with the development of science and Technology which have much influence in everyday life and the progress of the country. There are many defects in science education in Thailand. One problem in teaching science can be described through the statement in Mr. L. R. Comber's report............ " A tradition in which science is taught didactically as a number of more or less isolated facts and principles unsupportedly by first hand experience and often unrelated to everyday life in the modern world." In order to improve the curriculum and methods of teaching science, the Institute for the Promotion of Teaching of Science and Technology was set up with the cooperation of UNESCO. This institute will be responsible in working out the new curriculum, including methods and materials for teaching science.[4]

Fourth. **Problems in implementing the present curriculum.**

Teachers are expected to use the syllabi of the Ministry of Education as guides in their teaching, and text-book writers use the same guides in preparing books. The regional education officers have prepared courses of study containing lesson plans and suggestions for teaching methodology for each grade level. Although there are a few regional differences in the courses of study, they tend to be very similar because they are required to follow the prescribed curriculum exactly and because they must be used with the textbooks approved by the Ministry. The syllabi and the courses of study must be purchased by the individual school or teacher. Not every teacher has his own copies and, in fact, not every school has its own especially in outlying areas. Without the copies of the official syllabi, the schools and teachers lean heavily on the few testbooks they have to serve as guides for what is to be taught[5]. Many problems occur, for instance, obscured understanding on the part of curriculum practice. One of the major findings from the study of the primary School Curriculum is " The opinions of teachers and school administrators about the curriculum indicated that the foundation of the educational programme is in many respects unclear................"[2]

A research study for the causes of failure and drop-out among the lower elementary students in Kanchanaburi province were found to have multiple and complex factors. One of which was the teaching method.[6]

According to a study conducted by the Ministry of Education's Research Committee on Secondary Education, teaching methods in general still emphasize rote learning and mass recitation.[7]

II. Mechanics of Curriculum Development

Agency and Executive Machinery.

The Department of Educational Techniques, Ministry of Education is responsible for curriculum development and revision. The curriculum is developed in the centralized system, that is, the same curriculum, except for a few extra parts for the minority groups, is operated all over the country.

For the academic aspect, a permanent curriculum committee has been appointed by the Ministry of Education. It consists of the Director-Generals of all the departments. In addition, there are a few other specialists who serve as committee members.

Procedure.

The usual practice is to have the whole curriculum revised about ten years after the last revision. Then from time to time during the ten year period, seminars may be conducted for the improvement of instruction or for problems to be discussed.

When a need for curriculum change is felt, the Department of Education Techniques in consultation with the curriculum committee, appoints a sub-committee for each subject area. The drafting of the curriculum is done by the sub-committees appointed. Having considered the proposed curriculum presented by the sub-committees, the Curriculum Committee asks permission of the Ministry to conduct a seminar to which some teachers, supervisors and university professors are invited. The content of each subject is considered in group discussion. The final recommendations of the seminar are sent through the Curriculum Committee to the Ministry for final consideration and approval. Even when no major change in the curriculum revision is intended, a seminar may be conducted for the revision of a syllabus when there is a need to do so.

After all these treatments, the new curriculum plan is considered final. For the elementary grades, the Regional Education Office is authorized by the Ministry to prepare the syllabi for the schools in his particular region, taking into consideration local conditions. For the secondary grades, the Department of Secondary Education is vested with the responsibility of preparing the syllabi for the whole Kingdom.

When a curriculum is revised, textbooks must be revised or written, and teachers (both in-service and pre-service), must be informed so that they will be prepared for the implementation of the new curriculum.[8]

Curriculum Evaluation

The department of Educational Techniques is responsible for curriculum Evaluation. Seminars and researches are conducted for this purpose by University students, departments in the Ministry of Education and some educational institutes.

III. Strategies for curriculum change at present.

In 1970, a new Curriculum committee was appointed. It consists of the Director-Generals of all the departments in the Ministry of Education and heads of supervisory units of each department. The committee has the chance of finding the process and strategies for developing an effective curriculum. Many activities are in action. They are

— Two sub-committees have been appointed for the analysis of the present curriculum, both for primary and secondary education. The members of sub-committees include specialists, teachers and administrators. The curricular analysis is aimed to study the weaknesses in different phases of the curriculum in order to avoid and prevent the same defects in developing the new one.

— The National Scheme of Education is being reconsidered to function as the basic structure of education.

Recommendations have been submitted by the sub-committee analyzing the primary curriculum for the strategies in developing the new curriculum and in implementing it.[9]

A. For developing new curriculum.

— Developing of a new curriculum should not be entirely based on the old one as a reference source since doing so will result in the inflexibility of developing a sound new curriculum and may cause the same problems. A better way suggested here is to set up new ways of developing the curriculum by not sticking to the subject matter and time rate. Greater attention should be paid to the importance of experience, skill and the desired attitude needed in appropriate proportion to learner's maturity and nature of knowledge. Time should be set to suit the attention span of primary school students without paying any strict attention to the hours set-forth by the old curriculum.

— The following basic background should be considered.

1. Consider the necessities, the needs of the country and of the individuals in economic, social, and cultural aspects.

2. Consider the overall experiences needed by the public who are compelled to attend schools by the Primary Education Act.

3. Consider the trends and educational needs developing during the period in which the new curriculum will be introduced, i.e., approximately from 1977-1987.

4. Consider the developmental psychology of Thai children in the primary educational level.

5. Consider the practicality and possibility of psychology of learning and the change and progress of technology.

6. Consider the continuation of learning experience and the unity of various subject matters.

7. Consider the flexibility and applicability of the new curriculum in different varying regions, including minority groups, individuals and time.

— There should be a well-selected educational philosophy as a " heart " in developing new curriculum. This philosophy should be in connection with the background and unity of the country as previously proposed.

— The establishment of the goals, subject matter, contents and the frame of the curriculum should cover the three domains namely; cognitive domain, affective domain, and psycomotor domain. These experiences should be carefully blended.

— The committee appointed to develop curriculum should set up a full time intensive meeting. They should invite educators, experts from other fields of specialization, supervisors, teachers and administrators concerned with curriculum for consultation.

— The development of a new curriculum in the primary level should be closely connected with those of the pre-school and secondary levels and also that of non-school education or adult education.

— Should put in the curriculum itself clear suggestions on how to use the curriculum. This is to provide the effectiveness of practical use of the curriculum.

— The new curriculum should be used experimentally for limited time. This is to make room for more improvement.

— There should be a well-planned public relations programme continually over a period of time. This will help to cultivate the right attitude and understanding toward the curriculum among people in the educational field and general public as well.

B. **For effective Implementation.**

— It is considered to be the duty of every teachers training institute to inform their students to have clear understanding in every phase of curriculum.

— Fixed plan and steps of action of the in-service training programme for the supervisors and teachers should be set up. First, to demonstrate the model to the selected supervisors & teachers. Second, the supervisors and teachers from the wider areas study from the first group. Third, all the teachers over the country are trained by those two groups.

— Curriculum Laboratory Groups should be encouraged to set up in various regions or provinces in order to examine and follow up the implementation of the curriculum for a continuous process of improvement.

— Various methods of teaching should be improved in teachers training institutes and supervisory units. Greater attention should be paid to the actual classroom practice of effective teaching methods than oral or written suggestions.

— Revised and new textbooks should be accompanied by detailed teachers' manual and also work-books, if needed. These should be related to one another.

— In order to serve particular local needs or minority groups, a supplementary curriculum should be considered to promote relevance to the experiences & readiness of the children.

— Regulation should be set up to require all supervisors and teachers to possess the curriculum as a source of reference.

— Evaluation systems should be improved so that they will be in line with the new curriculum.

Centre for Curriculum Development.

In order to have the effective continuous process of curriculum development, a centre for Curriculum Development is being projected. The permanent officers of the centre will be concerned with administration, research and development of the curriculum.

The complete curriculum is planned to be implemented in different grade not at the same time but it will completely put into action all over the country in 1977. It has been well aware by the curriculum committee that for curriculum change, strategy is one of the most important factors, therefore, recommended strategies are now being carefully considered.

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STRATEGIES FOR CURRICULUM DEVELOPMENT IN THE PHILIPPINES

by

Mr. Domingo Soriano

Introduction

Curriculum development is an expected activity in education. Curricula have to be revised from time to time to meet the needs of learners. This means the development of more relevant syllabi, teacher's guides, textbooks, and the like. In the Philippines curriculum development as an organised activity started in the late 1950's. It can be said that this movement which started at the secondary level was much stimulated by curriculum development projects abroad; the U.S., initially, followed by projects from the U.K. and by adaptation projects of various other countries. From the secondary level, curriculum development spread downwards to the elementary level and then upwards to the college level. In the latter, however, the major activity has been in teacher education programs, both in-service and undergraduate levels, rather than in curriculum development.

This paper briefly presents some of the earliest curriculum projects undertaken by two of the major educational agencies in the Philippines, the Bureau of Public Schools and the University of the Philippines (Science Education Center in particular), which have continued smoothly and uninterruptedly over the years culminating in a truly national science education programme which now involves various other educational institutions and scientific organizations notably the National Science Development Board, and which is supported by several funding agencies particularly the UNICEF. This paper will be concerned only with those projects involving science and mathematics education for elementary and secondary levels.

PART I

The Bureau of Public Schools Science and Mathematics Curriculum Development Projects

Rationale and Accomplishments of the Projects

Science and mathematics curriculum development projects undertaken by the Bureau of Public Schools are to date in their tenth year development. The main purpose of these projects is to modernize the curriculum materials, particularly teachers' guides, on science and mathematics. The improvement work revolves around a continuing use, study and re-adjustment of the teacher's guides in science for the elementary grades (1-6) and for the first and second years of the secondary school, as well as teacher's guides in mathematics for the elementary grades (1-6) and for the first through third years of the secondary school. The materials of the science project in both levels (elementary and secondary) are oriented in rationale towards the **AAAS: Science A Process Approach,** while the materials of the mathematics projects were oriented towards the SMSG materials. However, the developments of the lessons and activities, are mostly indigenous. Simultaneously undertaken with this curriculum approach is the training of teachers in the use of the new guides so that they may be acquainted with the basic principles underlying their use, have personal experience in the science processes, and be conversant with the content organization.

The teacher's guides now in use in the field, the year each guide was prepared, and the present stage of development are as follows:

Elementary Science 1	1971	First revision
" " 2	1971	" "
" " 3	1968	" "
" " 4	1967	Initial tryout edition
" " 5	1967	" " "
" " 6	1967	" " "
General Science I	1965	Second revision
" " II	1965	" "
Elementary Mathematics 1	1966	First revision
" " 2	1966	" "
" " 3	1966	" "
" " 4	1966	" "
" " 5	1966	First trial edition
" " 6	1966	" " "
Mathematics 1	1965	Second revision
" 2	1966	First revision
" 3	1966	First trial edition
Geometry*	1968	First revision

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* The development of this guide is a joint project of the BPS and the Science Education Center, U.P.

Some of the salient characteristics of the guides are:

1. The description of the activities emphasizes the more desirable learning approach which is personal experience with problems, materials and phenomena;

2. The instructional objectives are stated in behavioral terms;

3. The materials for observations and experiments are mainly those easily procurable and the equipment are simple, and some are easily improvisable;

4. The sample evaluation items exemplify the measurement of specific observable behavior and the eliciting of critical or creative thinking.

5. In the science guides a unification of the various science fields is made more apparent through the organization of the content under only three main headings — living things; matter, energy and motion; anu earth and space, through the grades.

In general science, the first year curriculum concentrates on the study of living things and the earth in space, while the second year deals with matter-energy relationships.

6 In the mathematics guides content organization emphasizes the structure of mathematics as a whole from first grade through third year high school.

Strategies of Curriculum Development and Implementation

The development of the guides enumerated above was undertaken as part of the principle function of the Science Education Section of the Bureau of Public Schools to administer, study and update the science and mathematics educational offering in the first two levels of education. The preparation and production of the science and mathematics guides for the elementary level is a project assisted by the American Peace Corps in the Philippines, mainly through the services of Peace Corps volunteers. While the preparation and production of the science and mathematics guides for the secondary level has been a joint project of the BPS, UP, NSBD and the American Peace Corps in the Philippines. To write the guides, the Science Education Section called to curriculum writing workshops selected division science supervisors, classroom teachers and Peace Corps volunteers. Specifically, the criteria for selecting the participants to the curriculum workshops were (1) the degree of involvement and participation of newer teaching approaches and materials (2) the degree of success in classroom teaching, either alone or as co-teacher with a Peace Corps volunteer and (3) preparation in science and/or mathematics and in the use of new teaching methods in the said subjects, either abroad or through in-service program in the country.

The curriculum writing workshops were usually six-week programs and had as consultants science supervisors and curriculum coordinators in the Bureau of Public Schools, Peace Corps science and Mathematics consultants (science, science education, mathematics professors in the States) and science, science education, mathematics and mathematics education professors in the University of the Philippines. The chief of the Science Education Section, as director of these mathematics and science projects of the Bureau of Public Schools was assisted by a host of staff — full-time writers, part-time writers, librarian, technical consultants, general consultants, editorial consultants, typists, illustrators, editorial staff and coordinators.

An insight into how the curriculum workshops operated may be gained from a cursory study of the Appendix materials (Appendix 1, 2, 3, 4) which were excerpted from the documents of the curriculum workshops. Each workshop always aimed at and accomplished two goals, the writing of the guides and the production of the first copies. Because of the meager funding of each workshop, the writing staff spent part of their resting time (from writing) helping with the production work.

The use of the guides is now being spread to as many classes in public schools as possible, but a crash program of implementation was avoided because of the experimental nature of the materials and the inadequate background of many teachers in both science and science teaching or in mathematics and mathematics teaching.

Each of the four projects (elementary science, elementary mathematics, general science and high school mathematics) followed a separate plan of trial and implementation. Each of these projects will be discussed briefly below.

General Science. In the school year 1962 - 63, a Secondary Science and Mathematics Aides Project was agreed upon as a joint undertaking of the Bureau of Public Schools, the National Science Development Board, University of the Philippines, and the United States Corps in the Philippines. Filipino teachers in general science from eleven strategically located high schools and their Peace Corps Volunteers (PCV) co-teachers were called to the University of the Philippines for some re-training and for the writing of try-out guide in General Science. The BPS selected the teachers, U.P. trained them and PCV counterparts, and the NSDB financed the project. As a result of this the first experimental edition of General Science I and General Science.

The guides were tried out by the writers themselves in their respective schools in 1963 - 1964. They made notes on the try-out and sent the feedback to the Bureau of Public Schools (Science Education Section) where they were compiled and analyzed. This feedback led to the revision of the guide in summer of 1964 by a group of general science teachers and PCVs which included some of those who participated in the development of the tryout edition.

The revised guides were again tried out in the original eleven high schools and from other high schools where PCVs were assigned. Feedback was again gathered and based upon these findings a second revision was done on the guides in summer of 1965. A bigger number of this second revision guides was produced and sent to the fifteen high schools that used the first edition and to other high schools where teachers were qualified to use them. At present this second revised edition has been reproduced and is being used in most public high schools, including the newly organized barrio high schools.

High School Mathematics. Development of curriculum guides in mathematics for the high school started in September 1962 when Peace Corps Volunteers (PCV) with college degrees in mathematics and with some training in specific new mathematics program such as SMSG, UNISM, and others were assigned in each of eleven preselected experimental schools to serve as resources persons, consultants and co-teachers of selected Filipino mathematics teachers. In summer of 1963 the eleven Filipino teachers and their PCV co-teachers were gathered at U.P. where they took courses in modern mathematics and develop some teaching units for the first year high school. At that time no attempt was made to put the units in an organized sequential course.

In the school year 1963 - 1964, the teaching units prepared the previous summer and new teaching approaches were tried out. During the second semester of this year, the eleven Filipino mathematics teachers attended training program and at the same time developed a secondary mathematics curriculum. This group came out with a suggested outline of a mathematics course for the first year together with a detailed presentation of one unit. Using this as a starting point, a group of six teachers (those trained in U.P.) and six PCVs who had tried the new materials and teaching approaches in the experimental schools developed the Experimental Curriculum Guide in Mathematics I.

In 1964 - 1965 the guide was tried out in the eleven high schools and in twelve other high schools where there were teachers with adequate background in modern mathematics or where there were PCVs as co-teachers. Furthermore copies of the guide were given to U.P. professors for evaluation. The feedback reports of teachers and PCVs and evaluation report of the U.P. professors were used as bases for revising the guide.

In summer of 1965 a writing conference was held at U.P. In this conference the Experimental Curriculum Guide in Math I was revised and at the same time the Experimental Curriculum Guide in Math II was developed. The revised guide in Math I was used in high schools where there were teachers with adequate background in modern mathematics, while the guide in Math II was tried out in those schools where the original guide in Math I were used. Feedback reports on the use of the guides were again gathered.

In summer of 1966 revision work was done on the guide Math II. Simultaneously a guide in Math III was developed. The following year (1966 - 67) the whole process of trying out the guides was undertaken.

In summer of 1967, the BPS with the cooperation of the Science Education Center, U.P. and the American Peace Corps in the Philippines sponsored a workshop. In this workshop **High School Geometry, A Teacher's Guide** was developed. In developing this guide, the text **High School Geometry** written by the Science Education Center, U.P. was closely followed. The following year the guide was tried out in some high school classes. Feedback reports from this tryout in some high school classes were used as bases for the revision of the guide. The revision of the guide was then taken over by the Science Education Center, U.P.

In summary I would say that the development of the guides consist of a series of writing, field testing, revision. The supervision of the try out and their implementation is a function of the science supervisor. Much of the supervision of the field testing was actually done by the science or mathematics department head of each high school. In the organization of in-service training for other teachers, however, both supervisors and department heads, worked together.

Elementary Science. The first elementary science curriculum workshop was held in 1966. Its first finished product was **Elementary Science 3** which came out in the same year. This was sent to selected rural and urban school divisions scattered throughout the country for tryout by selected teachers under the supervision of the division science professors. In 1967, **Elementary Science** was sent to the same division for tryout with classes that used the Grade III guide. In the same year, Elementary Science 5 and Elementary Science 6 were studied by the intermediate science teachers and used in the succeeding year. In all these tryouts, feedback reports were gathered for the projected revision.

The development of curriculum guides was started in Grade III because at the time there was a greater need for better instructional materials in the upper elementary grades. Nevertheless, in 1968, the tryout copies of Elementary Science I and Elementary Science 2 were prepared and sent to all school division, together with the revised edition of Elementary Science 3. The feedback from the two years of tryout of Elementary Science I and Elementary Science 2 were compiled and revision of the guides was done in 1970.

Two big problems cropped up in this implementation, namely the insufficient pre-service background in science of many teachers, and the lack of sufficient time to get fully acquainted with the whole guide. So during the tryout period supervisors and key-teachers initiated programs for introducing the use of the guides.

Elementary Mathematics Weaknesses in arithematic instruction as revealed by various educational surveys and the apparent success of new mathematics programs abroad initiated the launching of tryout programs introducing new mathematics in a number of schools in 1962. Encouraging results of these tryout programs and the requests from teachers and administrators paved the way for the holding of the 1965 Summer Elementary Mathematics Curriculum Development Workshop sponsored by the Bureau of Public Schools and the U.S. Peace Corps/Philippines. As a result of this " Elementary Mathematics, A Curriculum Guide for Teacher's Use in Grades I - IV " was produced. The preparation of this guide considered the BPS arithmetic objectives in the light of new developments in learning theory and the precise concepts of new mathematics. This guide gave the teacher the necessary ideas on how to work on structured patterns and relationships which develop skills in identifying, describing, comparing, analyzing, reasoning logically and computing.

In 1965 - 1966 the guide was tried out in schools where teachers trained in new mathematics were available. From this tryout feedback reports were obtained and these served as bases of the revision work done in summer of 1966.

As the revision work was being done in summer of 1966, the guide for teachers' use in Grades V and VI was developed. This guide has not been revised yet.

The implementation of all these guides developed by the BPS is being accompanied by a program of in-service training which attempts to teach all the teachers who need re-training in the use of the new guides.

It will be noted that the type of evaluation pursued by the BPS is qualitative and based on teacher opinions and attitude. However their comments were found helpful in revising the guides.

PART II

The Science Education Centre (UPSEC) Curriculum Development Projects

Objectives and Organizational Structure of UPSEC

The Science Education Centre was organized in 1964 as a project of the University of the Philippines, originally completely funded by Ford Foundation. This assistance has been gradually withdrawn; and at present, through a special charter provided by R.A. No. 5506, local costs are borne completely by the University of the Philippines and the National Science Development Board.

The initial objective of the Center was the development of curriculum materials in mathematics and science for the elementary and secondary schools in the Philippines. Other functions of the Center have gradually developed, and have become on going activities. Some of these functions are :

1. Design and conduct innovative teacher educator programs (degree and non-degree) in science and mathematics.

2. Provide practising teachers with facilities and materials for tryout, enrichment and creative activities.

3. Encourage and conduct research studies in science education.

4. Produce and publish results of the research work in the Center and disseminate them in cooperation with the NSDB and the Regional Science Teaching Centres.

5. Design and test prototype equipment as an integral part to local curriculum development effort.

6. Provide consultant services in science and mathematics education to other institutions in the Philippines and abroad.

7. Develop and try out innovative instructional strategies, techniques, and technologies as applied to science and mathematics teaching, teacher education research and curriculum development.

To attain its objectives the Center has six faculty members from the Graduate College of Education and the College of Arts and Science of the University appointed as 1 full-time director and 5 full-time chairmen of the work groups. The work groups are Physics, Chemistry, Biology, General Science and Mathematics. The last two groups include Elementary Science (1 - 6) and Elementary Mathematics (1 - 6). The chairman of each work group has the major responsibility for directing and supervising the development of the curriculum materials (students' text and teacher's guide).

Each work group consists of experienced teachers and specialists. Its major function is the production of curricular materials, and of designs of equipment, models and other teaching aids. Except for the chairman and one or 2 research assistants, all members of the work groups are on part-time basis.

In developing the materials the various work groups are guided by the existing requirements of the Department of Education. They also consult with the Bureau of Public School personnel to help ensure that the materials will fit the needs and requirements of the schools.

Two committees helped guide the Science Education Center through its early years of development : the Steering Committee and the Advisory Committee. The Steering Committee included among others, the heads of units with which the Center works most intimately : the College of Arts and Sciences, the College of Education and the assistant director of the Bureau of Public Schools. This committee assisted the director of UPSEC in the operations of the Center as well as in reviewing manuscript before acceptance by the Center. The Advisory Committee was a larger body that advised on matters of policy. In it were represented various national institutions and agencies interested in science education and curriculum development. Both committees provided avenues for the eventual implementation and dissemination of the projects.

Recently, the Steering Committee was phased out, and only the Advisory Board functions.

Development of Curriculum Materials

The various groups followed a similar pattern of curriculum development. As a preparatory step, the chairmen spent some time acquainting themselves with the literature in science education particularly those that discussed new trends in science teaching. They examined the new curricula of various well known projects in this and other countries. The curricula guides and books currently used in schools were also examined by work group members to familiarize them with books used in the schools.

This preparatory step is then followed by the drawing up of an outline for each of the different subject areas by the respective chairman of each group with a few other individuals (subject specialists, teachers and educators). Most groups dealt with basic concepts which they believe could be taught to children at the different grade levels.

The first drafts of the outlines were then submitted to various groups of individuals : chiefly consultants experienced in curriculum development projects, members of the work groups, the Steering and Advisory Committees of the Science Education Center. The reactions, comments and suggestions from these various sources were considered in the preparation of the revised outlines.

Once the revised outlines were found acceptable by the work groups, writing assignments were given to the members with the chairman acting as over-all supervisor and editor. On the high school level development of the textbooks and laboratory exercises were given priority. Laboratory exercises are incorporated with the text. Teacher's guides for all books are developed soon after the experimental editions of the text are completed.

The elementary science group started working on teacher's guides for Grades 1, 2 and 3. As soon as the guides are completed the pupils work book will be developed. For grades 4, 5 and 6 the group is working on a pupil's text and teacher's guide simultaneously. This is done also by the mathematics group (both high school and elementary levels).

How is the group writing accomplished? Each group met frequently early in the project to discuss the outline and possible ways of developing this. Once writing assignments had been given, the whole group met less frequently; contacts of individual group members are mainly with the chairman concerned, or with full time SEC staff members who serve as links to the other group members. This pattern of work stems out of the circumstances regarding the work groups. Most of the members work on their own time in the SEC projects. They all have their full-time job elsewhere. A manuscript assigned to a writer is submitted to the chairman who reviews the materials and may return the manuscripts with detailed suggestions on both content and presentation. Sometimes the chairman consults with other specialists/educators. This is more often done by the elementary science group which has subcommittees that review the manuscript to decide whether or not these are acceptable. Manuscript may be revised up to 3 or even more times before they are accepted by the chairman or the sub-committee. Most manuscripts are then submitted to the Steering/Advisory Committees of the SEC. These are then returned to the chairman who takes the responsibility of incorporating the changes suggested.

Every curriculum material developed by the Center is tried out in actual classroom situations for 2 years and undergoes a systematic and detailed evaluation. In selecting the experimental schools, an attempt was made to obtain an approximate representative sample of schools. However, because of limited resources, particularly in terms of personnel of the Center, necessarily, only a small number of schools could be involved and these had to be within commuting distance of the University. Included within this small sample, were different types of schools: public, private, rural, suburban, city schools as well as sectarian and non-sectarian schools. Moreover the experimental classes were chosen such that a few high and low classes (in terms of grade averages) are included but the larger number are average classes.

It was hoped to match all experimental classes with control classes. However, this was not possible. Those that could be matched were identified on the basis of comparable mental ability and science background. Both groups, experimental and control, were given a pre-test intended to provide a baseline for describing the groups. At the end of the school year, post-process tests were given to both groups. These provided information on the learning related to the methods of science achieved by both groups. It should be pointed out here that only experimental groups are using the SEC materials; control groups use the books prescribed by the school system.

Achievement tests are given only to experimental classes. No statistical comparisons are made among classes or schools. The major use of these tests are : to determine whether or not the objectives of the materials are being achieved and to provide specific information on processes and concepts which are being learned or not learned, as one of the bases for examining the materials for purposes of revision.

Qualitative data are periodically gathered through forms developed for the purpose, in addition to monthly meetings with the subject chairman. Every experimental teacher reports on each chapter or activity. Student reactions (high school level) secured twice during the evaluation year.

It should also be pointed out that the evaluation program includes meetings with administrators of the experimental schools. Generally one meeting is called early during the school year to acquaint the administrators with the total program and its objectives; to find out what problems in the implementation of the evaluation program might occur, how they can be avoided, etc. A second meeting at the end of the school year is called. At this second meeting a report is made by the evaluation chairman. This is followed by questions, discussion, suggestions, given by both administrators and the evaluation chairman for improving the evaluation program.

Curriculum revision is then based on evaluation results which include : feedback reports from teachers, observers and students classroom observation by SEC staff, achievement test performance, monthly meetings with teachers, experience in teaching the course in summer. In addition to these other factors such as practicability of the materials, availability of supplies and equipment, suitability of materials.

In connection with the try out of materials, the Science Education Center conducts summer institutes which are primarily intended to orient selected teachers to the new materials and to their role as experimental teachers in the evaluation program. In general the pattern followed for these institutes includes : (1) pre-testing and post-testing of participants, to reveal areas of weaknesses around which the institute can be organized, and to find out by comparing pre-and post-test results, how much gain was made in these areas at the end of the institute; (2) discussions, activities and lectures on processes of science and selected topics in the subject pertaining to each group; (3) performing some of the laboratory exercises and learning how to teach them; (4) teaching selected lessons to a sample class, followed by an analysis of the presentation; (5) some sessions on behavioral objectives and construction of test items. These institutes are usually held in summer prior to the year when a particular curriculum material is to be tried out.

As soon as a curriculum material (student text or teacher's guide) is revised on the bases of the results of the evaluation, it is reviewed by an editoral committee consisting of one subject specialist, one educator and one English expert. The revised curriculum material together with the comments and suggestions of the editorial committee is returned to the chairman of the work group. The chairman of the group incorporates the suggestions and the curriculum material is then prepared for publication.

The following table shows the different curriculum materials developed by the Center and the state at which the material is developed.

Biology for Philippine High Schools	
Text	Commercial Edition
Lab manual	„ „
Teacher's guide	„ „
Common Plants of the Philippines	„ „
The Gene: a Handbook for Teachers	„ „
Common Animals of the Philippines	Being developed
Fundamentals of Physics —	
Text	Commercial Edition
Teacher's Guide	Being developed
Chemistry for Philippine High Schools —	
Text	Commercial Edition
Teacher's Guide	Being developed
Elementary School Mathematics 1 —	
Text	Being prepared for commercial publication
Teacher's Guide	Being prepared for commercial publication
Elementary School Mathematics 2 —	
Text	
Teacher's Guide	Being prepared for commercial publication
Elementary School Mathematics 3 —	
Text	
Teacher's Guide	Being revised
Elementary School Mathematics 4 —	
Text	
Teacher's Guide	To be revised
Elementary School Mathematics 5 —	
Text	„ „ „
Teacher's Guide	„ „ „
Elementary School Mathematics 6 —	
Text	„ „ „
Teacher's Guide	„ „ „

High School Mathematics I —	
Text	Being revised
Teacher's Guide	" "
High School Mathematics II —	
Text	To be revised
Teacher's Guide	" " "
High School Mathematics III —	
Text	" " "
Teacher's Guide	" " "
High School Geometry —	
Text	Being revised
Teacher's Guide	" "
Elementary School Science 1 —	
Text	Being prepared for commercial publication
Elementary School Science 2 —	
Text	Being developed
Teacher's Guide	Being reviewed by editorial committee
Elementary School Science 3 —	
Text	To be developed
Teacher's Guide	To be revised
Elementary School Science 4 —	
Text	Experimental Edition
Teacher's Guide	" "
Elementary School Science 5 —	
Text	" "
Teacher's Guide	" "
Elementary School Science 6 —	
Text	" "
Teacher's Guide	" "
Environmental Science I —	
Text	Being revised
Teacher's Guide	To be developed
Environmental Science II —	
Text	Experimental Edition
Teacher's Guide	To be developed
Integrated Science I —	
Text	Experimental Edition
Teacher's Guide	" "
Integrated Science II —	
Text	Being developed
Teacher's Guide	" " "

The last four curriculum materials are materials for First and Second Years in the high school. Environmental Science series is oriented towards the ESCP materials. However its development is indigenous. On the other hand the Integrated Science series is an adaptation of one of the junior high school science curriculum projects in the U.S., the Intermediate Science Curriculum Study (ISCS). The first curriculum material in the list above, Biology for Philippine High School, is also an adaptation of a biology curriculum project in U.S., the Biological Sciences Curriculum Study (BSCS).

In carrying out the adaptation work the pattern of curriculum development followed is similar to the pattern of development of the indigenous materials. It only differed in the preparatory stages. Instead of examining various curricula of well known projects abroad, the curriculum materials to be adapted are actually used in one school for feasibility study. After this feasibility study the pattern described above is then followed.

A summary of the strategies employed in the various curriculum projects seems to be in order at this point.

1. Identifying and defining objectives. Objectives tended to be generally stated in the beginning. These became more specific as they were defined in the context of such subject area. It should be admitted that each work group kept on formulating and reformulating objectives throughout the projects. A sample list of objectives for secondary school science as worked out by UPSEC staff is shown in Appendix 5. In Appendix 6 UPSEC staff state the differences between what they believe their course materials attempt to do in comparison with conventional books. This, together with the statement of objectives incorporate the ideas which the staff attempt to implement in the curriculum projects.

2. Establishing work groups each headed by a subject chairman, to be involved in teacher training; two or three full-time members, and several ad hoc, part-time members; scientists, teachers, research assistants constitute membership in this group.

3. Setting and conducting a writing period : this takes a minimum of one calendar year for an experimental edition. A writing sessions or conference is held in summer when a large group of teachers can be called together. A great amount of raw manuscripts can be produced in 6-week summer session. These manuscripts can be refined during the succeeding school year by a smaller group. There must be constant interaction between the writers and the subject chairman (either individually/as a group) and between chairman, ocnsultants and specialists.

4. Securing adequate funds for the tryout of materials. The experimental books are given out free to the schools selected for the tryout. Generally, equipment specific to the materials are also provided free (or loaned)

to the schools. A general principle followed by most projects has been to make the use of the experimental books possible at no additional costs to the schools.

5. Preparing and implementing an evaluation program: the Evaluation Team is comprised of an evaluation chairman (educational psychologist/psychometrist)) with one or more research assistants; the program includes work with subject chairmen to prepare test items; plan evaluation program for each year, prepare tests, administer tests, analyze data and prepare reports. In the course of these activities, chairman meets with experimental teachers and their administrators, confers with subject chairman and director of the project.

6. Preparing and implementing a teacher training program. As a start this program is meant for the experimental (tryout teachers) but later on improved courses were incorporated in teacher education degree programs (graduate and undergraduate levels).

7. Revision and preparation of commercial editions. Each volume undergoes at least two revisions. These revised editions are generally limited in circulation to the writing group and their consultants. In this connection, the need for a supporting staff of scientific art illustrators and printing technicians should be pointed out. This is especially true in countries where publishing houses cannot provide first rate services in scientific art illustration work.

8. Dissemination of the materials. Before the books become available commercially, the project organizers should have a fairly good plan which will ensure that the books reach the schools. This may mean working with the Department of Education, and securing the necessary permission for use of the books.

It is hoped that these experiences in curriculum development in Philippine setting will contribute in some way to similar projects in other Asian countries.

Appendix 1

ELEMENTARY SCIENCE CURRICULUM WRITING WORKSHOP

Pius XII Catholic Center
United Nations Avenue, Manila
January 15 — February 24, 1968

POINTS FOR ORIENTATION

Workshop Goals

1. To prepare new science curriculum guides for Grades I and II designed for a 170-day school year, but with provision for enrichment.

2. To revise the Grade III science guide in the light of feedback reports and suggestions and of the Grades I and II science materials.

Nature of Anticipated Products

1. The primary aim is to present science as a system of inquiry and a problem-solving approach.

2. Experiences stress discovering ideas and developing basic skills of the scientific process.

3. Utilization of mathematical thinking in relevant situations.

4. Materials and equipment involved in the activities are those readily procurable.

5. Activities stress active pupil involvement in both individual and group work.

6. Development takes into considering the appropriateness of the science content to the maturity level of the group of children and the psychological process of learning.

Objectives of Elementary Science

1. To develop in the child familiarity with the interest in natural phenomena and to cultivate the attitude of esteem for facts and of learning directly from nature.

2. To develop in the child the ability to recognize problems in their natural circumstances, and the ability to treat and solve problems logically on the basis of facts.

3. To develop in the child an understanding of the fundamental principles involved in natural phenomena.

4. To develop in the child an understanding of the relationship between nature and human life, and to cultivate the attitude and the ability to conserve natural resources.

Goals for Elementary Science for Grades I and II

1. To cultivate in the child an active interest in the study of science.

2. To develop in him curiosity about the familiarity with day-to-day occurences in his natural environment.

3. To develop in him basic scientific skills and fundamental understandings about things and phenomena in his natural environment.

Experiences Necessary to Realize Goals

1. Observation and simple interpretation of natural phenomena.

2. Play activities leading to awareness of phenomena or simple science principles.

3. Communicating observations, verbally at first, and later by drawings, written descriptions, and graphs (pictorial).

4. Construction of simple projects, toys and records of observation.

5. Simple experiments.

Appendix 2

GUIDELINES FOR THE REVISION OF THE TENTATIVE GUIDES IN GENERAL SCIENCE I AND II

1. There should be a provision in the guide by which teachers can be made aware of the fact that not all lessons in the guide could be taught by the "Discovery Approach."

2. Use the term "discovery approach" rather than "inductive method."

3. Role of experiments:

    a. That experiments are used as a means of enabling the students to understand and use the processes involved in the scientific method.

    b. That experiments are used as a means of arriving at certain concepts.

    Both of these should be emphasized but with varying degrees. In the earlier part of the course emphasis is more on (a) and in later part of the course emphasis should be on (b).

4. Historical approach in teaching certain lessons should be used where it is applicable.

5. The guide should provide activities for the slow learner to enable them to learn at their own rate.

6. Re-examine the different experiences provided in the guide to see if they provide activities for both the slow learner and the fast learner.

7. In putting down the objectives, the content and activities the level of expectation for the different groups of learners should be indicated.

8. Preview of each unit should contain:

    a. What concepts and skills one must have acquired previously in preparation for the study of the unit.

    b. Scope of the unit.

    c. Instruction for the teacher on how to teach the unit, what to emphasize and what should be optional.

9. Teachers to participate in the summer work should bring samples of test measures which they have tried out. They should also bring the copy of the guide which is to be revised.

10. Concepts, principles and generalizations should be stated as organizational elements.

11. The organization of the two guides (General Science I and II) as a whole should be re-examined to see the possibility of rearranging the sequences of the units and to find out what unit or units in General Science I could be made as part of General Science II and vice versa.

12. Format of each unit should be as follows :

UNIT TITLE

I. Preview (to be developed according to No. 8)

II. General Objectives

III. Constant Outline

IV. Unit development

   1. Statement of concept to be developed.
      Rationals about the concept.
   2. List of references.
   3. Specific objectives (to be stated in such a way that the teacher can clearly see what is to be expected)
   4. Teaching activities
   5. Evaluation (This could be given after a series of 3 or 4 concepts have been taken up and should be only hints as to what is to be evaluated)

   1. ....
   2. ....
   3. ....
   4. ....
   5. ....

V. Evaluation (This could be in the form of tests or other devices which could be used to evaluate the student's accomplishment for the whole unit.

13. Each of the units of General Science I should be revised in accordance with the following points :

POINT TO CONSIDER IN REVISING SCIENCE I

For Unit I

1. The organization of this unit should be revised such that the course in General Science I would be introduced with an observation lesson, after which the students will be made to generalize what they learn from the exercise. This would mean that the Mystery Box or similar experiments should come first. Then link this lesson with the work of scientists, method they employ, why and how of scientific method may also lead into the development of lesson on nature and scope of science.

2. General Objectives given in the guide should be re-examined to see which are really general and which are specific.

3. Specified objectives should be provided.

4. Contents should re-examined to see the possibility of including the following :

    a. Biographies of Filipino scientists.
    b. Nature and scope of science and its importance to life.
    c. Temperature and use of thermometer.
    d. Rationals on the construction and use of graphs.

5. Inaccuracies of the content of each unit as pointed out by consultants should be corrected. (Copies of consultant's correction will be available during the summer).

6. Teaching activities concerning the topics on mathematical skills should be re-examined and modified.

For Unit II

1. The overview should be recast according to guideline No. 8.
2. The given specific objectives are general in nature.
3. Provide specific objectives.
4. The teaching of the topic Soil Acidity should go only as far as making the child realize that the soil has varying degree in acidity and how to determine it. This should be pointed out to the teacher.
5. Suggested teaching activities should be re-examined to see if they are effective in accomplishing the specific objectives.
6. The sequence should be re-examined to see the possibility of re-organizing the different topics.
7. Modify the lesson used in introducing the unit so as to give a situation where in only a few variables are included.
8. The experiment on chlorophyll should be modified.

etc. — up to Unit V.

Appendix 3

BUREAU OF PUBLIC SCHOOLS
Manila
TENTATIVE SCHEDULE OF WORK

January 17 — February 19, 1966

Monday	Tuesday	Wednesday	Thursday	Friday
January 17 Orientation	January 18 Preparation of Area " scope and sequence "	January 19	January 20 A.M.—Review of Area I P.M.—Review of Area II	January 21 A.M.—Review of Area III P.M.—Development of Format
January 24 Grade II — Development of the Units — writing of concepts and activities, etc.	January 25	January 26	January 27 Discussion and Crtique of Grade IV materials (Area I, II & III)	January 28 Finalizing of Grade III materials by area groups
January 31 Grade IV — Development of the Units — writing of concepts and activities, etc.			February 3 Discussion and Critique of Grade IV materials (Areas I, II & III)	February 4 Finalizing of Grade IV materials by area groups
February 7 Grade V — Development of the Units — writing of concepts and activities, etc.			February 10 Discussion and Critique of Grade V materials (Areas I, II & III)	February 11 Finalizing of Grade V materials by area groups
February 14 Grade VI — Development of the Units — writing of concepts and activities, etc.			February 17 Discussion & Critique of Grade VI materials (Areas I, II & III)	February 18 Finalizing of Grade VI materials by area groups

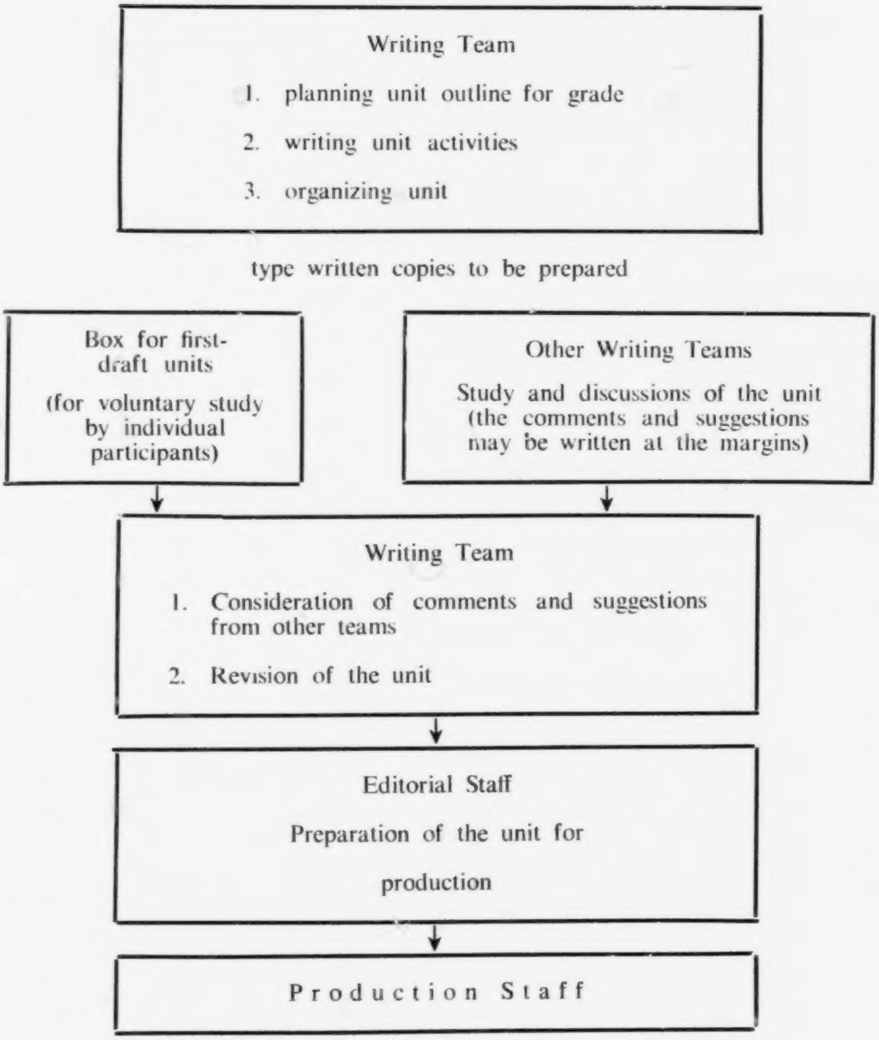
Appendix 4

ELEMENTARY SCIENCE CURRICULUM WRITING WORKSHOP

Pius XII Catholic Center

United Nations Avenue, Manila
January 15 — February 24, 1968

FLOW CHART OF EACH WRITTEN UNIT


Writing Team
1. planning unit outline for grade
2. writing unit activities
3. organizing unit
type written copies to be prepared
Box for first-draft units
(for voluntary study by individual participants)
Other Writing Teams
Study and discussions of the unit (the comments and suggestions may be written at the margins)
Writing Team
1. Consideration of comments and suggestions from other teams
2. Revision of the unit
Editorial Staff
Preparation of the unit for production
Production Staff

Appendix 5

UNIVERSITY OF THE PHILIPPINES
SCIENCE EDUCATION CENTER

Objectives of Secondary School Science

A secondary school student who has completed his secondary science courses should be able to:

1. Demonstrate understanding of basic science concepts in biology, chemistry, physics, earth science in such ways as:
    - 1.1 describing and explaining natural phenomena
    - 1.2 identifying scientific principles involved in a particular situation
    - 1.3 applying concepts to new situations
2. Apply the processes of science such as:
    - 2.1 identifying a problem, defining and delimiting it
    - 2.2 constructing hypothesis
    - 2.3 making accurate observations
    - 2.4 collecting, recording and organizing data
    - 2.5 analysing and interpreting data
    - 2.6 designing and performing simple experiments/investigations
    - 2.7 identifying and controlling relevant variables
    - 2.8 making independent conclusions based on relevant data
    - 2.9 making inferences
    - 2.10 making predictions based on a given set of data
    - 2.11 making and using conceptual models in science
3. Display scientific attitudes such as:
    - 3.1 recognizing limitations of science
    - 3.2 weighing evidence
    - 3.3 suspending judgement when evidence is insufficient
    - 3.4 willingness to be convinced by evidence
    - 3.5 open-mindedness
    - 3.6 persistence
    - 3.7 tolerance
    - 3.8 curiosity
    - 3.9 recognizing the tentativeness of conclusions/scientific information
    - 3.10 respect for life
    - 3.11 intellectual honesty
    - 3.12 cooperation in working with others
    - 3.13 objective discussions of controversial issues
4. Recognize some social implications of science in relation to man and his environment such as those related to conservation, pollution, population, health and sanitation, agriculture, medicine and advances of technology.

Appendix 6

UNIVERSITY OF THE PHILIPPINES
SCIENCE EDUCATION CENTER

Differences Between New Courses and Traditional Courses in Science

1. Emphasis of the new courses is on **functional** knowledge and concepts, i.e., instead of learning information **per se,** students are encouraged to **use** this information to observing, describing such observations, discussing, interpreting and applying concepts. The direction of the new courses is away from giving information for its own sake; rather, the direction is towards concept building and relating information to relevant concepts.

2. The new courses emphasize development of intellectual skills (see objectives, processes of science)

3. Emphasis on **laboratory oriented** courses (student activity). The lab exercises are designed as investigations, problems to be solved, to which no answer are found in the text. Most of the exercises in the new courses are designed to make the student find out information for himself, and use these as bases on which to build concepts.

STRATEGIES FOR CURRICULUM DEVELOPMENT IN SINGAPORE.

by

Mr. Lim Chin Chee,
Member of Delegation,
Republic of Singapore.

In our view, curriculum development is a continuous process which requires constant review in order to ensure that such development is consistent with the needs and expectations of the individual as well as the society. Towards this end, we established a standing committee, known as the Advisory Committee on Curriculum Development (ACCD) in 1969. This Committee is headed by the Director of Research, and its members include the Chief Examinations Officer, representatives of our two universities, Inspector of Schools, Principals and teachers. Its terms of reference are to advise the Minister for Education on all aspects of curriculum and to supervise the implementation of such recommendations as may be approved by the Minister. Specifically, the Committee's functions include the following :—

1.1 to identify the specific objectives of education in Singapore, both national and academic;

1.2 to be responsible for harmonising subject objectives with overall objectives;

1.3 to ensure that objectives are not only reflected in the curriculum, but are attended to in practical terms;

1.4 to re-examine the criteria by which subjects are selected for inclusion in or exclusion from the curriculum and the criteria by which time is allocated to the various subjects;

1.5 to review the membership and functions of the various subject sub-committees and to coordinate their activities;

1.6 to attend to controlled, trial implementation of the new curriculum with proper concomitant evaluation.

2. Having defined the aims and objectives and set up the relevant criteria for the development of the curriculum, stage by stage, the ACCD then established a standing sub-committee for each of the subject areas. The main functions of these subject committees are as follows :—

2.1 To develop subject curriculum according to the stated general educational objectives.

2.2 To advise the Main Committee on questions and problems of teaching and learning relating to the respective subject areas in the school curriculum.

2.3 To assist in the supervision of pilot projects and their evaluation in collaboration with the Director of Research.

2.4 To report to the Main Committee on their own Programmes of activities, progress of evaluation, etc.

2.5 To make suggestions for improvement of the teaching and learning in the respective subject areas.

Members of these Standing Committees include teachers who have had special training in the relevant subject area, principals of schools, teacher-trainers and specialist inspectors. We feel that the school library and educational mass media are important supporting services for the effective implementation of the curriculum. Hence sub-committees were also formed for school libraries and educational technology.

3. Consequent upon the formation of the ACCD and the subject Committees, the first draft of the Curriculum for the first 2 years of our primary education was completed in 1970. In the revised syllabuses, the instructional and behavioral objectives for teaching each topic and unit are specified so that the teacher may know precisely what he should look for as a result of his teaching. Furthermore, the first 2 years of our primary education are treated as one unit so that greater flexibility is allowed in teaching, and children with adequate educational experience are not held back. At the same time, children without the advantages of environmental stimulation before their formal education may spend more time on the acquisition of basic skills.

4. In order to acquaint the teachers concerned with the objectives of the new curriculum, workshops and seminars were organised before the adoption of the new syllabuses. Guidelines setting out methods of approach to each topic were also issued. However, we do not prescribe any particular teaching method for our teachers. We encourage them to adopt the methods that are most effective in their own teaching situations.

5. The first revision of our primary school curriculum will be completed by 1973. Meanwhile, as evaluation is a necessary concomitant for the ascertainment of the outcomes of our new curriculum, instruments for evaluation are being devised and pretested.

6. Our secondary school curriculum is also being examined by the ACCD. Preliminary discussions have been held by the subject committees, one of which has already written prototype materials for tryout in schools.

STRATEGIES FOR CURRICULUM DEVELOPMENT IN MALAYSIA

by

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Preamble

Curriculum development is a long-term process encompassing the planning, developing, revising, and implementing of curriculum programmes. In Malaysia, acceptance of the term "curriculum" in its broader sense has been gradual. In the past the term "curriculum" was synonymous with the syllabus. Thus "curriculum" has been the programme of studies as proposed in the syllabus, outlined and formalised by the Ministry of Education. It has been assumed that the teacher given the syllabus would be able to use his creativity and skill to develop his own scheme of work and at the same time using the course textbook as his main source of instructional materials. This assumption is now being questioned.

"Curriculum", however, is at present being viewed more broadly. Rather than consisting of just the syllabus or the programme of studies, it is now considered to be the total teaching programme for any given subject, including the syllabus and several other supporting materials. It includes the basic and supplementary teacher-pupil materials, teaching aids and other supplementary teaching and learning materials such as evaluation instruments. The development of materials to fit the broader concept of curriculum has just recently been undertaken in Malaysia. Strategies for curriculum development then are only becoming formalised and streamlined in parallel with the gradual acceptance of curriculum as being more than just the syllabus alone.

Within the past several years, the Ministry of Education, with full-time staff, has implemented several curriculum improvement projects. The experience gained in these projects so far has begun to form the basis for the evolution of strategies for more effective and efficient curriculum development. The task of formalising and implementing these strategies will eventually be the responsibility of curriculum workers who will be on the staff of the Educational Development Centre of the Ministry of Education now being planned.

In this transitional stage, before the Centre becomes fully operational, curriculum work is still being carried out on an ad hoc basis.

This paper will deal with the topic "Strategies for Curriculum Development in Malaysia" from two points of view :

(i) Past and Current strategies.

(ii) Proposed strategies.

1. Past and Current Strategies

When curriculum meant only the syllabus or "programme of studies," the strategy for curriculum development was to convene an ad hoc committee whose responsibility and task would be merely to draw up the syllabus. More often than not this was done on a part-time basis by the committee members who would meet together for a relatively short period of time to do the job. There are cases where the committee members would meet infrequently over a period of a year or more, with a resulting loss in continuity of work from meeting to meeting. Coordination between committees working on the various syllabuses occurred rarely, and in very few cases only were there any preparation and production of the supporting materials beyond the syllabus.

Now with the changing concept of "curriculum", curriculum development in Malaysia is approached rather differently. Projects are still initiated by the Central Curriculum Committee, the decision-making body for curriculum matters. The members of this Committee are the Directors of all the various divisions of the Ministry, and representatives from the Faculty of Education, University of Malaya, and the Dewan Bahasa dan Pustaka, a quasi-governmental agency that publishes books and other instructional materials. This Committee is chaired by the Director-General of Education Malaysia.

The Central Curriculum Committee appoints a small team of officers to look into the programme. This committee would develop a curricular-programme and present it to the Central Curriculum Committee. This programme is then sent to all State Curriculum Committees for suggestions and comments. These suggestions and comments are later used to finalise the programme, to be approved by the Central Curriculum Committee. It is then sent for publication and for implementation in the schools.

Recently, there has been some slight variation in curricular development procedure. Previously, the group of officers would present a programme to the Central Curriculum Committee for its approval. Now the team would present their recommendations and proposed plan for action. Only when these plans for action are approved by the Central Curriculum Committee would the group begin work to develop the programme and other supplementary and supporting materials.

Current practices in curriculum development may be classified as follows :—

A. Development of a new or revised programme of studies.

B. Development of teacher-pupil materials within the existing programme of studies.

C. Revision of a programme.

D. Adoption of a programme.

A. Development of a new or revised programme of studies

When a programme of studies is found to be outdated and quite unsatisfactory action is taken to produce a new or revised programme of studies for the subject area. An example of this type of curriculum project is the "Primary Civics" Project.

A subject committee, consisting of representations from the various divisions of the Ministry of Education, representatives from the Department of National Unity, and teachers from schools, was appointed by the Central Curriculum Committee to produce a new curricular programme. This Committee prepared a draft syllabus. A sub-committee consisting of several practising primary school teachers, teacher trainers and a member of the Federal Inspectorate then developed a teachers' guide to accompany the draft syllabus. Both the draft syllabus and the teachers' guide were sent to State Curriculum Committees for comments and suggestions. These materials were also sent to selected schools to be tried out by several teachers. These teachers were later called together to attend a workshop at which they gave their opinions and comments on the feasibility, suitability and relevance of the revised programme of studies. The syllabus and teachers' guide were then finalised in the light of the comments and suggestions put forward by these teachers and the State Curriculum Committees.

The time chart for this project was as follows:—

September 1970	Formation of subject committee to draw up the syllabus.
January 1971	Formation of sub-committee to write the teachers' guide.
May 1971	Both syllabus and teachers' guide were presented to Central Curriculum Committee for a decision.
May 1971	Syllabus and Teachers' Guide were tried out in 165 schools. About 250 teachers participated in the try-out.
August 1971	A Workshop was held to finalise the syllabus and teachers' guide. The participants were 66 teachers who tried out the syllabus. (6 from each of 11 states in West Malaysia).

October 1971	Final draft of syllabus and teachers' guide were accepted by Central Curriculum Committee for implementation in 1972.

In this type of curriculum development, the teachers are given a free hand to develop and devise their teaching strategies. Teacher-pupil materials are produced by interested publishers. This strategy allows the teachers great latitude in the use of the syllabus. However the teachers generally look to the examinations for guidance on the emphasis and sequencing of topics and subject matter. It tends to lead to rigidity and overdependence on examinations.

B. Development of supporting materials within an existing Programme of studies

This type of curriculum project is to produce supporting materials to clarify an existing syllabus, and to introduce modern teaching-learning techniques. An example of this type of curriculum project is the special project on Primary Science and Mathematics. A team of writers given adequate secretarial and supporting staff are writing materials for use by teachers. The materials, although local in character, draw ideas from similar programmes developed and used in other parts of the world. As the teaching techniques used in the teachers' guides are new and rather unfamiliar to teachers, a core of teachers has been selected and given training on the use of the teachers' guide sheets. These teachers teach their classes and act as models for other teachers in the locality. Their schools have been designated as **Centres of Excellence.** These teachers also conduct in-service courses at district levels. In this way more teachers are reached. The teachers are periodically given additional orientation courses.

The writers in the curriculum team are given the opportunity to visit the schools and teachers using their materials in order to discuss and exchange ideas with the teachers.

Teachers' guide sheets are being developed for both Science and Mathematics. So far, materials have been developed for Standards I, II and III. The materials are being used in selected schools. Materials for Standard IV and Standard V are expected to be completed by the end of 1972. Materials for Standard VI will be completed in 1973. Thus in 1974 all mateirals for all primary school classes will be completed. However, it is expected that the curriculum writers will still be working to revise the materials in the light of comments and suggestions that will be made by teachers. There is a programme to evaluate the materials for Standards I, II and III currently being used in schools. For this first phase of evaluation, data will be gathered from teachers. At the second phase, evidence of pupil learning and levels of achievement will be collected.

Teachers are reached through in-service courses given at the Centers of Excellence and at the District Centers (where the courses are given by a new set of core teachers trained by the regional group), and at Residential Centers during school vacations for those teachers whose schools are too difficult to reach during school terms.

Teachers' guide sheets are sent to every classroom in the country. However, only teachers who have attended orientation/in-service courses are required to use the materials. There are a number of teachers who have not yet been reached by these courses. Use of materials by them would be optional. It is expected that by late 1970s all teachers would have been exposed to the materials and thus will be able to use the guidesheets.

Another mode of exposure and orientation to the teachers of the new programme is the newsletter. This newsletter is published at regular intervals, and contains answers to questions and queries posed by teachers on the guidesheets. Thus it includes clarifications or further suggestion on the use of the materials. It is also being used as a forum whereby teachers can put forward their suggestions and comments to be shared by other teachers. It is hoped that this newsletter will put teachers in various localities to be in contact with one another.

The reaction to this programme has been very encouraging. Several teachers have themselves developed alternative teaching aids to be used. Other teachers have been exchanging experiences with one another. Clearly the attempt to introduce "discovery" learning to the children have also touched the teachers with the same spirit of "discovery learning."

Initial support for this programme was provided by the Asia Foundation but the Ministry of Education is gradually taking over the funding of the whole project.

C. Adaptation and modification of an existing programme from abroad

This type of curriculum work is undertaken when a programme developed in another country is adapted for use locally after appropriate modifications. The modifications and adaptations are made in content, sequencing and emphasis.

An example of such a programme is the **Pure Science Programme** for Upper Secondary Schools. This programme is a modification and an adaptation of the United Kingdom Nuffield "O" Level Physics, Chemistry, and Biology Programme to fit the Malaysian context.

An officer, appointed by the Central Curriculum Committee, prepared a plan of action with the assistance of officers from United Kingdom. Practicing teachers were recruited to assist in the adaptation and modification of the materials. These teachers were oriented to the Nuffield programme by officers of the Ministry of Education who have had experience with the programme, and by officers from the Nuffield programme itself. During the school holidays the teachers wrote materials for Malaysian schools based on the Nuffield programme. The teacher-writers, and other selected teachers also tried out some of the new materials in the classrooms before the first set of printed materials was prepared for trials and implementation.

At present the programme is being implemented in a selected number of schools where the teachers have been oriented to the programme. The Centre for Education Development Overseas (CEDO) of the United Kingdom has been assisting the Ministry of Education in this programme.

D. Adoption of a programme from abroad

Sometimes a programme developed elsewhere, can be adopted for local use with only minimal modification. Such adoption represents another type of curriculum activity. This type of curriculum work mainly involves developing methods of training teachers to use new curriculum materials, collecting feedback information on problems that may indicate a need for modifications. The feedback information will form the basis for the programme to implement the programmes.

An example of such a programme is the **Integrated Science Programme** for Lower Secondary Schools. This programme represents an adoption of the Scottish Integrated Science programme with appropriate revision made under the guidance of a Scottish Team. The Central Curriculum Committee gave an officer of the Ministry of Education the responsibility of implementing the programme.

Teachers were identified for training. Initially this training was conducted by a joint Malaysian-Scottish team. As the programme is being implemented in schools some of the originally trained teachers have become trainers of succeeding groups of teachers, and the Scottish team has gradually been withdrawn. By 1974, the Integrated Science is expected to have reached all lower secondary schools in Malaysia.

2. Problems confronting current strategies

It is apparent from this brief discussion of some curriculum programmes currently being developed that there are in existence in Malaysia some strategies for curriculum development but it is also apparent that there are problems yet to be overcome. For example, the programmes described here are carried out in different divisions of the Ministry. This represents some duplication of resources, staff, and on occasions, of materials. There are some 23 curriculum projects existing and operating in the different divisions of the Ministry. The programmes have not yet been coordinated, although in the Science, Mathematics, and Languages, curriculum work is being carried out at all levels of school. Many of the people involved in curriculum work have not had the opportunity to be adequately trained in the theories of curriculum work including evaluation.

It is in recognition of these problems that planning is now underway for the setting up of an Educational Development Centre where curriculum workers will have the facilities and support necessary to alleviate some of the shortcomings presently being experienced. There is also a programme for the training for curriculum workers both locally and overseas.

3. Proposed Strategies for Future Curriculum Development

Curriculum work covers a wide range of subject areas and may cover one or a combination of several subjects, depending upon whether the development is a completely new programme, or the revision, modification, adaptation, or adoption of existing programmes. There is then no one strategy of curriculum development. The strategies proposed here would be the general stages in the process of curriculum development.

The proposed steps for curriculum development in Malaysia are as follows :—

1. Pre-planning
2. Planning
3. Developing Instructional Materials
4. Try-out
5. Field Trial
6. Implementation and Quality Control

Evaluation is a very important component of this process, and it will be built into and run through all the various stages. The above process will involve several different groups, namely :—

1. The Central Curriculum Committee
2. National Educational Development Centre (N.E.D.C.) involving :—
    (a) Subject Area Committees,
    (b) Curriculum Teams
    (c) Evaluation Teams

3.1 PRE-PLANNING — initiation for change

The need for educational change may arise from various factors such as the poor performance of sutdents in the external examinations, reports by officials of the Ministry of Education, and social, economic or political pressures. Actions bringing about change will be initiated through the Central Curriculum Committee. This Committee will make the decision for change and will request the National Education Development Centre to form a committee to formulate general objectives and the scope of content for changes in the subject concerned. This new committee would be the Subject Committee.

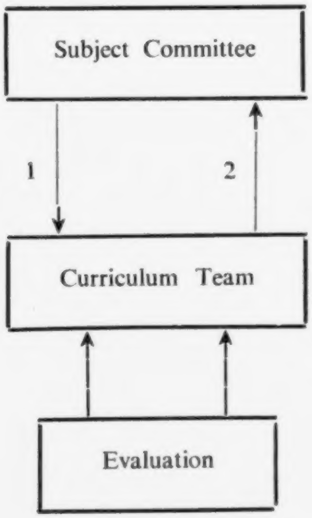
The main members of this subject committee would be a curriculum specialist, subject specialists, and decision makers drawn from the Ministry of Education and other relevant government or semi-government agencies.

3.2 PLANNING — Strategies for change

When the Subject Committee had formulated the general objectives and defined the content area, a **Curriculum Team** will be formed. This team would be responsible for planning in detail the specific, instructional and behavioral objectives, the specifications of content, and suitable learning experiences required by the programme.

It is at this stage that a decision has to be made as to which point in the curriculum development process formal evaluation should be introduced. Thus at the stage of planning, an evaluation specialist may be brought into the discussion as a " consultant."

Curriculum development at this stage may be represented as follows :—



Activities :

(a) Formulating general objectives.

(b) Defining general content.

(c) Specifying objectives and content.

(d) Specifying strategies for development, evaluation, and implementation of the programme.

3.3 DEVELOPMENT OF INSTRUCTIONAL MATERIALS

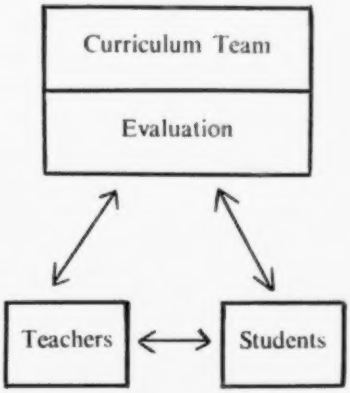
Having made the basic decisions and the basic planning the Curriculum Team will begin to develop instructional materials for the programme. The team will include a curriculum specialist, a Subject specialist, an Educational Psychologist and teachers. At this stage the curriculum team will also be extended to include some technical specialists for lay-out, illustration and editing of materials. A few members of the committee, preferably the teachers will be the writers of the materials. This whole team will be based at the Education Development Centre and will be provided with the necessary supporting staff and facilities.

The materials developed will include instructional materials for the pupils and teachers, instructional aids and teaching-learning strategies. During the development of the instructional materials the committee will need feed-back in the form of comments, opinions, and information about the suitability of specific portions of the materials developed.

At this preliminary stage of developing and modifying the materials, the curriculum team will need to approach a small number of teachers and students to get feedbacks on the suitability of the materials. This may involve trying out certain segments of the programme with children, either in an actual classroom or a simulated situation within the Centre.

Some simple forms of evaluation such as the analysis is of the materials developed to ensure logical order and sequencing in the levels of difficulty, and balance of content with objectives. It is anticipated that the members of the team will have had some basic training in the rudiments of testing and the formulating of test items.

During the development of Instruction Material the work-flow would be as follows :—



Activities

(e) Specifying topics

(f) Selecting appropriate learning experiments.

(g) Formulating appropriate materials, teaching-learning strategies.

(h) Producing the first draft of curriculum programme.

3.4 TRY - OUT

The first draft of the programme will be tried out in a few selected schools. Members of the curriculum team will be involved in this very important stage when the programme is to be modified and revised.

It is at this stage that the materials would be in actual use by teachers and students. The curriculum team will need information on the relevance, suitability, feasibility and effectiveness of the curriculum programme. Questions about the difficulty of content, language level and the sequencing of the materials will be answered to enable modification and revision of the materials.

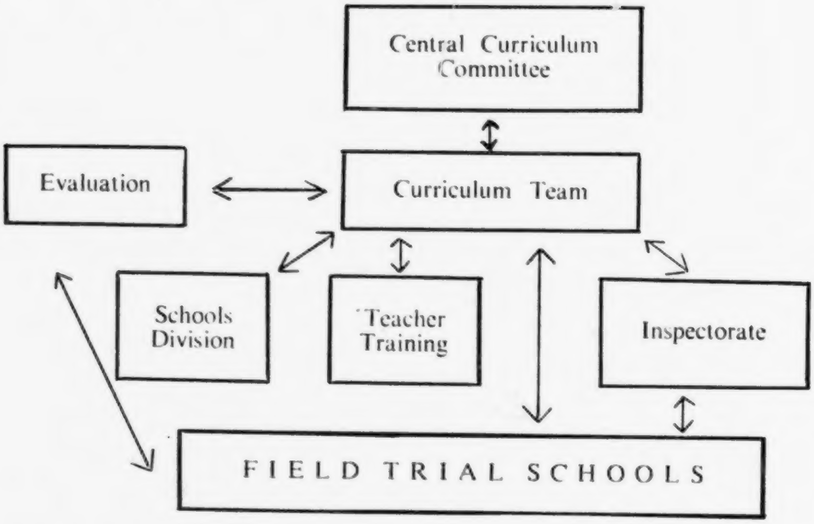
It is at this time that evaluation may involve the services of a separate unit brought in to support the curriculum team. This **Evaluation Unit** would be brought in to help formulate test items. Because the number of schools, teachers and students would be quite small, it is anticipated that the evaluator and members of the curriculum team will be able to administer the necessary tests, and gather other necessary data :

3.5 FIELD TRIALS

The revised draft of the instructional materials will be tried out in larger number of schools. The members of the Curriculum team would be actively involved. But because of the time and distance between schools, the Curriculum team would call upon other outside personnel to assist them. These outside personnel may be officers of the Ministry, particularly from the Divisions of Teacher Training Schools Division and the Inspectorate. A programme to orientate teachers to the programme would be conducted by members of the Curriculum Team at the Curriculum Centre.

The evaluation specialist would be an important component of the team at this stage. He would be concerned with sampling procedures, development of tests (formative and summative), and other process of evaluation.

During Field Trial the activities would be as follows:—


Central Curriculum Committee
Evaluation
Curriculum Team
Schools Division
Teacher Training
Inspectorate
FIELD TRIAL SCHOOLS

Activities

(1) Collecting data on the suitability, feasibility and effectiveness of the 2nd draft of the materials prepared.

(2) Modifying and revising the 2nd draft.

(3) Producing the final draft of the curriculum programme.

Using the feed-back from the larger number of schools trying the whole programme, the curriculum programme will be finalised. The final form of the curriculum programme will then be presented the Central Curriculum Committee for formal acceptance and sanction for implementation in the schools.

3.6 IMPLEMENTATION AND QUALITY CONTROL

Implementation and quality control are critical elements in the overall development of new curriculum programmes. It is at this stage of development that the programme is put into the educational system. A great deal of planning is required to ensure that implementation is smooth and effective. Teachers will need to be oriented to the philosophy and techniques of the new programme, to learn about the availability of instructional materials and how to use them. Teachers and developers will need to communicate with one another so that questions and doubts can be cleared up, and so that adjustments can be made where difficulties arise. Allowances must be made for the fact that a new programme is being used by large numbers of teachers for the first time. The assumptions which are made about teachers and which form the basis of inservice work will need to be carefully examined.

In the Malaysian situation the implementation of a curriculum programme will be the responsibility and task of several divisions of the Ministry of Education viz. the Schools Division, the Teacher Training Division, the Federal Inspectorate, and the Examinations Syndicate.

The preparation of teachers and their orientation to new programmes, particularly pre-service, is the responsibility of the Teacher Training Division. In-Service courses will be carried out by the Teacher Training Division in close conjunction with the Curriculum Team. There will be allowances of adequate time to ensure that adequate number of teachers will be prepared to use the programme.

The dissemination of the curriculum materials will be the task and responsibility of the Schools Division. This includes the planning for dissemination of the materials, ensuring that the materials get to teachers and pupils on time. In fact any administrative action required for curriculum materials to reach the schools, and be used by schools (i.e. the availability of teachers) will be the responsibility of the Schools Divisions.

Quality Control will be the responsibility of the Federal Inspectorate and the Examinations Syndicate. At the ground level there may be problems on teaching techniques, use of instructional materials and other such practical problems. Teachers would want to have the opportunity to discuss and possibly to be advised on the optimum usage of new curriculum materials. The Federal Inspectorate is the one group of professionals able to offer such help to teachers and schools during the implementation of the programme.

Another step in quality control would be the formal evaluation of the programme within the educational system. This would involve the collection of data on pupil achievement and attainment through the curriculum programmes, and analysis and interpretation of such data. This will be the responsibility of the Examinations Syndicate, the examining body of the Malaysian educational system.

At any stage or step of implementation and quality control, it may be necessary for any of the four divisions to utilize the assistance and expertise of the curriculum team.

Thus there will be close liaison between all five divisions of the Ministry, the Education Development Centre, the Schools Division, the Teacher Training Division, the Federal Inspectorate and the Examinations Syndicate during the implementation stage.

The curriculum team could be disbanded at the end of Stage 5 i.e. Field Trials stage. Thus the members of the team may go back to their respective institutions. Nevertheless, there will be provisions for the project director or co-ordinator of the team to remain as a permanent member of staff of E.D.C. This will ensure that there will always be somebody at hand should there be any necessity for consultation or advice on the curriculum programme.

3.7 The above section has been an attempt to outline the possible steps which could be followed to develop a curriculum programme in a highly centralised educational system such as that in Malaysia.

At the moment, there are not enough personnel to perform all the activities described. There are several qualified personnel at the Universities, and it is proposed that they be brought in to work on the curriculum team, preferably as consultants, and where possible as full members of the team to complement the work of officers of the Ministry.

The model proposed above is based on the assumption that a curriculum team will be housed at a Centre where there will be facilities such as a research library and adequate secretarial and supporting staff. There may come a time when professional curriculum workers may be available in other parts of the country. It may then be possible to decentralise curriculum development so that it can be conducted regionally, to be attached at the State Education Offices, or any Teacher Training Colleges.

This may be possible in the years ahead, particularly if a system of teachers-on-attachment could be worked out. Such teachers would be given the necessary professional training so that they could be effective members of curriculum teams. When a curriculum project is completed, they will return to schools. Over a period of time there will be many such teachers all over the country. They in turn could hasten some curriculum reforms.

4. Basic Problems

Regardless of the types of curriculum work that have been undertaken, the problems that arise are almost identical. These probelms are problems of timing, financing, involvement of teachers in the field, and the problems of implementation.

TIMING is very important, so as to ensure the availability of skilled technicians and of facilities. This is where careful planning is very critical. There should be enough lead time to ensure that personnel are sent for the necessary academic or professional training, and be back in time to work on the new project.

FINANCING can sometimes be a limiting factor in the development of a curriculum programme. There should be careful planning to ensure that all contigencies are provided for. This will include provisions for adequate materials, secretarial and supporting staff.

INVOLVEMENT OF TEACHERS IN THE FIELD is another critical factor contributing to the success or failure of the programme. There may be the tendency to have writers who are quite removed from the real school situation. It is important that teachers who will ultimately be the consumers of the materials be consulted and involved in the development of the programme right from the initial stage of pre-planning of the programme.

PREPARATION FOR IMPLEMENTATION has often been neglected in the process of curriculum development. It is very important that teachers, who will be using the materials, know how to use them. There should be a plan for comprehensive teacher-orientation. Initially this may be carried out by the members of the curriculum team themselves in close co-operation with Teacher Training Division.

Taken together, the strategies for curriculum development in Malaysia, as elsewhere, pose challenging problems to the educational planners. How successful the present planning in Malaysia is will be seen in the next decade. It is premature to say whether the strategies now used and here proposed will bring about the most effective and efficient mode of curriculum development. Careful planning is now being done, and this, we believe, is the first step towards significant improvements in Malaysian education.